Soil and Crop Science
Society of Florida

The Soil Science Society of Florida

•

PROCEEDINGS

Volume 1

1939

•

FIRST ANNUAL MEETING OF THE SOCIETY

HOLLYWOOD

April 18, 1939

•

OFFICERS OF THE SOCIETY

1939 - 1940

R. V. Allison .... President
Gainesville

Michael Peech .... Vice-President
Lake Alfred

Henry C. Henricksen .... Member Executive Committee
Eustis

Richard A. Carrigan .... Secretary-Treasurer
Gainesville

Acknowledgments

•

The publication of this first volume of the Proceedings of the Soil Science Society of Florida has been made possible largely through the generous interest of and contributions by the following organizations:

The U. S. Sugar Corporation

The Chemurgic Research Corporation

The Florida Power and Light Company

On behalf of all those attending the organization meeting of the Society on April 18, 1939, in Hollywood, and of the substantial membership of more than three hundred and fifty persons that has developed in the course of the first official year of the existence of the Society, the Executive Committee wishes to take this opportunity to thank the Florida State Horticultural Society for its generosity in sponsoring our organization meeting in the fine manner that it did; also the Hollywood Beach Hotel for the splendid hospitality and service provided by its officers and staff throughout the meetings.

— THE EXECUTIVE COMMITTEE.

TABLE OF CONTENTS

Reprinted
From the Report of the Committee on Resolutions, American Society of Agronomy, presented at the Annual Meeting of the Society, Washington, D. C., November 17, 1938.

•

Robert Marlin Barnette

DOCTOR ROBERT MARLIN BARNETTE, Chemist at the Agricultural Experiment Station of the University of Florida, was killed instantly on the evening of October 31, 1938 while driving alone in his car a few miles north of Gainesville. In the immediate family of his parents Dr. Barnette is survived by three sisters and a brother, all living in South Carolina at the present time. Dr. Barnette was born in Rock Hill, County of York, South Carolina, November 30, 1900. In 1920 he graduated from Clemson College and in 1923 received the Ph. D. degree from the University of New Jersey where he specialized in soil chemistry.

Following his graduation from the New Jersey institution, Dr. Barnette spent a year abroad in travel and study. His study was divided equally between the Rijkslandbouwproefstation in Groningen, Holland, where he studied under Dr. D. J. Hissink and at the Eidgenossische Technische Hochschule, in Zurich, Switzerland, where he spent much of his time in the laboratories of the late Professor George Wiegner.

Following his return to the United States, Dr. Barnette worked for two years as Assistant Chemist at the Tennessee Agricultural Experiment Station. In 1925 he was appointed Assistant Chemist at the Florida Agricultural Experiment Station, became Associate Chemist in 1929 and Chemist in 1932. At the time of his death he was in charge of the Land Use Division of the Department of Chemistry and Soils.

As indicated by his published works, Dr. Barnette has largely interested himself in the fundamental nutrition of plants especially as influenced by the physical characteristics of the soil environment in which they grow. Having studied with Wiegner and Hissink in Europe just at the time base exchange phenomena in the soil were beginning to be understood and their importance appreciated, Dr. Barnette became a pioneer worker in this field in Florida and in the Southeast. Throughout his work both organic and inorganic colloids were emphasized and the importance of the role of organic matter in the soil in this and other connections repeatedly pointed out.

In the death of Dr. Barnette the American Society of Agronomy and the Soil Science Society of America have lost a keenly discerning and energetic worker. To all who have had personal associations with him and especially to those of us who have been privileged to live and work closely with him there can not but come a deep feeling of loss in the passing of a staunch and ever sympathetic friend.

R. V. Allison—

In dedicating this First Proceedings of the Soil Science Society of Florida to the memory of Doctor Barnette, the many scores of his friends who are now members of this Society, established since the time of his death, are fully conscious that there was little in this life closer to "Barney's" heart than the advancement of Soil Science, especially as it related to those conditions peculiar to Florida. For many months prior to his death the development of such a Forum was constantly in his thoughts. In honoring him thus the Society and all that it stands for in turn is honored by the vision and record of a life whose passing preceded its birth.

Foreword

•

The Soil Science Society of Florida was organized particularly to serve Florida Agriculture. Its forum is open to all who are sincerely interested in discussing any of its multitudinous problems that have a definite relationship with the soil. In the words of our Provost for Agriculture, Doctor Wilmon Newell, "There is an important place in Florida Agriculture for a forum of this type that can be used as a 'clearing house' for the technical worker and the grower, as well as others engaged in closely related enterprises that find common interest in the practical application of the basic principles of Soil Science. The technical worker may be able to assist the grower from time to time with some of his knotty problems, but no less will the grower assist the technical worker by this opportunity to bring in his problems and experience for a good and thorough discussion. I fear that this latter angle of benefit is too frequently overlooked."

This service can be developed in two particular ways: (1) By holding local or state-wide meetings that will be followed by published or mimeographed proceedings and (2) By intensive study and development of well-defined fields of subject matter through carefully appointed committees as provided by Article IV of the Constitution.

The attendance upon and interest in our organization meeting in Hollywood, of which the present Proceedings is a record, represents a definite example of what can be accomplished by the first means. Our growers are particularly interested in local problems or in group problems that center around a particular crop or type of farming. Others of our workers are interested in state-wide soils problems, a good and thorough discussion and understanding of which will add to the effectiveness of their service in many respects. Both groups can readily be reached by the forum of the Soil Science Society.

The committee phase of the work lends itself particularly to the organization and development aspects of the Society and its program as a whole. This is covered in detail in a proper section of this Proceedings where the names and personnel of the committees appointed to date are listed and their individual responsibilities outlined in a general way. From certain standpoints this is one of the most important activities of the Society, that is, if each committee will study its assignment or assignments carefully, analyze its data clearly and report upon it candidly.

That a similar interest exists in other states is indicated from the fact that such a society as ours was organized in Indiana under the genial leadership of Dr. George W. Scarseth on the evening of December 10, 1938, thus preceding ours here in Florida by four months.

It is our carefully considered opinion that there is a truly vital place in the framework of the national organization (Soil Science

Society of America) for active state sections or societies of this nature since a strong national unit then results merely by a careful piecing together of the energies and enthusiasms of the local groups. The national officers would thus be relieved, to a large extent, of the tedious routine of membership responsibilities and the maintenance of general interest in the work. Likewise state forums of this nature can take care of "local" problems and the national programs thus freed of much material of this nature that falls definitely below the level of national interest.

Such a plan of development would leave the national officers more time for the consideration of programs and plans of work of which the Science is so badly in need at the present time. We should like to join Indiana in a friendly challenge to workers in still other states where interest in all phases of soils work may incline them to the development of a local or state forum for the intensive development of this important branch of the Agricultural Sciences.

Preliminary Organization Meetings at Gainesville

A. January 12, 1939.

At the close of a general discussion of a number of soil problems by a group of workers in Gainesville on the evening of January 12, the oft-discussed question was again raised of organizing a definite Soil Science Society of Florida. The chief advantages cited were:

1. The forum of such a society could entertain the discussion of a wide variety of subjects in the field of Soil Science and closely related sciences as they pertain to Florida Agriculture with simultaneous advantages to the technical worker, the commercial worker, the grower and any others who may be interested in attending and taking part.
2. Such meetings and discussions would assist very materially in maintaining state-wide interest and sustaining membership in our national society, simultaneously improving our contributions to the national forum and leaving the national officers greater freedom to work on other than routine matters.

This meeting was called largely for the discussion of methods of analysis and was attended by twenty workers in the field of soils and allied subjects, including representatives from the Everglades Experiment Station at Belle Glade and the Citrus Experiment Station at Lake Alfred.

Interest in the formation of such a society grew in a surprising way in the course of the discussion and an organizing committee consisting of Dr. R. V. Allison (Chairman), Mr. R. A. Carrigan (Secretary), Dr. F. B. Smith, Dr. Michael Peech and W. L. Tait was set up.

By general agreement it was decided that steps should be taken to set up a state-wide society or forum consisting of individuals or organizations interested in the development and application of Soil Science in Florida. It was proposed that the possibility of holding an organization meeting in conjunction with the regular annual meetings of the Florida State Horticultural Society some time in April, be explored. There was a general understanding, furthermore, that in the event of its successful formation, the State Society might later undertake to establish some form of affiliation, as a State section, with the Soil Science Society of America.

B. March 27, 1939.

A second meeting was called at Gainesville on March 27, 1939 for the purpose of furthering the plans for the formation of the State Society. Essentially the same group was present as attended the earlier meeting. At this time a preliminary draft of a proposed Constitution and By-Laws was presented and thoroughly discussed. It was accepted as provisional for presentation at the state-wide organization meeting.

The Chairman placed before the meeting an invitation from Col. B. F. Floyd, Secretary of the Florida State Horticultural Society to hold the state-wide organization meeting of the Soil Science Society of Florida in conjunction with the annual meeting of the Florida State Horticultural Society in Hollywood, in April. This generous invitation was accepted by unamimous vote and the organizing committee was instructed to make plans accordingly.

Final Organization Meeting in Hollywood

April 18, 1939

•

A. Minutes of the First Annual Meeting of the Soil Science Society of Florida, April 18, 1939.

The meeting was called to order at 2:00 P. M. by the Chairman of the Organizing Committee, Dr. R. V. Allison. The first order of business was a call for the selection or election of an acting chairman for the organization meeting. A motion was made, seconded and carried that Dr. Allison serve in this capacity.

Copies of the proposed Constitution and By-Laws were distributed to all present. It was then read Article by Article and Section by Section. Following a suggestion of the chairman that informality be observed in regard to eligibility for voting, a motion to accept the proposed "Constitution and By-Laws" as written was passed by a unanimous vote.

Since the Constitution, as accepted, provided for the inclusion of the immediate past president of the Society in the Executive Committee, it was necessary that an election be held to select someone to fill this post for the first year of the Society's existence. Accordingly, a nominating committee was appointed by the chairman to select nominees for this position as well as make nominations for the offices of President and Vice-President. The nominating committee consisted of Dr. J. R. Neller, Belle Glade, Dr. H. C. Henricksen, Eustis and Mr. R. L. Braddock, Belle Glade. Following brief deliberation, the committee recommended the names of Dr. R. V. Allison, Gainesville, for President and Dr. Michael Peech, Lake Alfred, for Vice-President and suggested that nominations be made from the floor for the open position on the Executive Committee. Motions were then made from the floor that nominations for President and Vice-President cease. The motions were seconded and favorably voted on.

Nominations for "Member of the Executive Committee" were made for the following men: Mr. W. F. Therkildson, Miami, Dr. O. J. Sieplein, Miami, Mr. R. P. Thornton, Tampa and Dr. H. C. Henricksen, Eustis. Dr. Henricksen was elected by a second ballot. Mr. R. A. Carrigan was appointed Secretary-Treasurer by the President.

There was considerable discussion in the meeting relative to eligibility for membership in the Society. The opinion of those present was overwhelmingly in favor of throwing membership open to all who might be interested in the objectives of the Society to the extent of giving it their support. It was generally understood that eligibility for membership would not be contingent upon technical or scientific standing or professional occupation, but that one of the chief aims of the Society would be to bring the technical man and the practical

grower together in a forum where an open discussion of the problems and experiences of all would result in mutual advantages to members of both groups.

Immediately after the business meeting a program of general interest involving four papers or discussions as listed below, was presented. Due to the enforced absence of Mr. Harold Mowry, who was scheduled to read a paper on "The Place of Soil Science in a Program of Agricultural Research for Florida," Dr. T. S. Buie, Regional Conservator of the Soil Conservation Service, Spartanburg, South Carolina, kindly consented to speak extemporaneously on this subject. Mr. Herman Gunter, State Geologist of the State Board of Conservation, Tallahassee, Florida who was scheduled to speak on "Problems of Hydrology Related to Florida Agriculture," was also unfortunately unable to attend the meeting. In his place Dr. Allison gave an impromptu discussion of the soil and water conservation problem in the Everglades.

B. Contributed Papers:

A program of contributed papers and discussions was rendered as follows:

1. The Place of Soil Science in a Program of Agricultural Research for Florida.
Dr. T. S. Buie, Regional Conservator, U. S. Soil Conservation Service, Spartanburg, South Carolina.

2. The Soils of Florida.
J. R. Henderson, Department of Chemistry and Soils, Florida Agricultural Experiment Station, Gainesville, Florida.

3. Methods and Limitations of Soil Analysis,
Richard A. Carrigan, Department of Chemistry and Soils, Florida Agricultural Experiment Station, Gainesville, Florida.

4. The Soil and Water Conservation Problem in the Everglades.
Dr. R. V. Allison, Head, Department of Chemistry and Soils, Florida Agricultural Experiment Station, Gainesville, Florida.

The Place of Soil Science in a Program of Agricultural Research for Florida

•

Dr. T. S. Buie

•

Florida's sphere of agricultural influence radiates far beyond its boundaries as a large percentage of its farm products, particularly citrus fruits and vegetables, is sold outside of the State. Modern merchandising methods have helped create a widespread consumer demand, and thousands of persons outside of the State are engaged in the distribution and marketing of these products. In addition to citrus fruits and vegetables, Florida also produces substantial quantities of grain, tobacco, cotton, and sugar cane.

The demand for Florida agricultural products also has led to a high degree of specialization in farming practices. Practices that insure high yields, especially of crops for out-of-state markets, are employed. Growers, too, have been quick to adopt the latest methods developed by agricultural science that enable them to take greater advantage of a variety of climate and soil conditions.

From the foregoing we can see that the interest in Florida's agriculture extends far beyond its citrus groves, large vegetable tracts, and other farming areas. That means that a large part of the Nation is directly concerned with the manner in which Florida handles its soil resources. If these resources are misused and should the soil's productivity be so seriously affected that high yields are no longer possible, I'm sure that consumers farther north would quickly point a condemning finger at Florida. They, too, would be affected.

Climatic conditions give Florida a decided advantage over other States in the race to reach northern markets. But regardless of this favorable condition, Florida will do well to make an inventory of its soil resources as a basis for their proper management. Its hopes for a balanced and permanent agriculture will fall short unless its land is used wisely.

How to use the land better than we have is not a simple problem. This objective can not be achieved without concerted planning and action by farmers, aided by every Federal, State, and local agency that has anything to contribute to better land-use practices.

The soil scientist makes a definite contribution to better land use. He determines the physical, chemical, and biological nature of the soil, which furnishes the scientific background for dealing with the practical problems. His services should be of particular value in Florida as the state has a large variety of soils. This makes the land-use problem more complicated, and the services of the soil scientist all the more necessary. All soils can be put to good use provided their capabilities are fully understood.

One of the major functions of soil research is to furnish a solid foundation for land-use classification, which in turn develops into proper land-use planning. Not until areas are at least classified roughly as suitable or not suitable for specific farming purposes will it be possible for Florida to safeguard itself against the tragic mistakes of land misuse so evident in many other sections of the country.

I am particularly glad to have had the opportunity to take part in the inauguration of the Soil Science Society of Florida, and I feel certain that its contributions will play no small part in the preservation of Florida's most valuable heritage, its soil.

The Soils of Florida

•

J. R. Henderson

•

Soils are natural bodies. Like people, they are born, develop gradually and become mature. Furthermore, the characteristics of soils, like those of the human races, vary in response to the environment under which they have developed. The features of a Swede are markedly different from those of a Mediterranean, and those of the Mediterraneans are unlike those of an African. Similarly, the soils of warm regions are unlike those of cold or temperate regions; those of humid regions unlike those of arid regions; and those of poorly drained areas unlike those in well drained areas. Thus, the soils of Florida should be markedly different from those of Alaska, Ohio, or Utah, and those in one part of the State, different from those in some other part; and indeed they are. Let us examine, therefore, the features by which soil differences are recognized.

If in any well drained, gently rolling area, a hole is dug from the surface down to the unaltered geological formation, and the exposed profile examined, several distinct layers will be noted. Further examination will show that each of these layers differs from the others in several important characteristics of which the most distinct are: (1) color, (2) texture, (3) structure, (4) consistence, and (5) thickness.

Variations in the characteristics described above exhibited by different soils are due to variations in one or more of the following soil-forming factors: (1) parent material, (2) relief, (3) age, (4) climate, and (5) vegetation.

The modern system of soil classification is based upon the differences in soil characteristics which have developed under the influence of the soil-forming factors in various combinations and degrees of intensity.

In the field, soils are classified into three simple units—the series, the type and the phase. The soil series is a group of soils alike in all characteristics except the texture and in some cases the thickness of the surface layers or "A" horizons. The series is named for some town, county, river or other prominent landmark where these soils were first recognized. For instance, the Norfolk series of soils were first given official recognition at Norfolk, Va.

The soil type is a subdivision of the soil series which, wherever it occurs, is uniform in all characteristics. The soil type is named by adding a term denoting the texture of the surface layer to the soil series name. Examples: Norfolk fine sand and Norfolk fine sandy loam. Sometimes a soil type differs from the typical in some external characteristic which is important from the standpoint of land use as slope, erosion, or degree of stoniness. Such variations are called phases and are designated by adding a descriptive term to the soil type name. Example: Norfolk fine sand, flat phase.

These simple units of classification are used in ordinary soil survey work but they are too numerous for use in gaining a comprehensive idea of the soils over wide areas. Consequently, the series are grouped into "families" and these into "great soil groups" and these into still larger groups and so on until all soils are grouped into three orders. Logically, the numbers of features taken into consideration decrease as the groups become more inclusive.

Of these larger units we are concerned here with only two—the orders and the great soil groups. The three soil orders are—zonal, intrazonal and azonal.

The zonal soils have well developed profile characteristics which reflect the dominating influence of the active soil forming factors, climate and vegetation. The intrazonal soils have well developed profile characteristics which reflect the dominating influence of relief or parent material. The azonal soils have poorly developed profile characteristics which reflect youthfulness, or extreme conditions of parent material or relief.

Within these three orders there are 25 "great soil groups". In Florida, the three soil orders are represented by eight of the great soil groups.

I AND II. THE RED AND YELLOW SOILS

The zonal order is represented by the Red and Yellow great soil groups. These soils are characterized by brownish-gray, grayish-brown or reddish-brown surface layers over yellow, brownish-yellow, yellowish-brown or brownish-red sub-surface layers over yellowish-red, red or dark red subsoils. The subsoil rests upon gray, yellow and red mottled parent material. The Yellow soils are characterized by light gray, gray or dark gray surface layers over yellowish-gray, grayish-yellow or yellow subsurface layers over yellow or yellowish-red subsoils. The parent material beneath the subsoil is yellow, gray, and red mottled. Both the Red and Yellow soils are acid or slightly acid throughout the profile.

Since the Red and Yellow soils are very closely associated, the various series can best be described in groups which include members of both great soil groups.

1. "Clay Lands" of West Florida.

From Madison west across the northern half of the panhandle, the soils consist of sandy loams which have developed from marine deposits of sands and clays. The soils in this area may be divided into three groups. The differences between the three groups find their greatest expression in the texture and consistence of various layers of the profile. Within each group the differences are mainly color differences which are expressed most significantly in the subsoils. (see Table I.)

2. Central Florida Hammock Areas.

In the high lime hammocks of Marion, Alachua, Citrus, Hernando and Pasco Counties are found three soil series the parent materials of which have been derived from or influenced by the underlying limestones. The important characteristics of these soils are shown in Table II.

3. Sandy Soils of West Florida.

From Madison County west a group of sandy soils lie between the "flatwoods" to the south and the "clay lands" to the north. Three soils—Norfolk, Ruston and Orangeburg sands are found in the area. They differ from the sandy loams of the corresponding series (already described) in that the colors of the sub-surface layers of the sands are the same as those of the subsoils in the sandy loams and the subsoils are found at greater depths.

4. The Central Ridge of the Peninsula.

Extending from Hamilton County south to near Lake Placid in Highlands County is a ridge occupied mainly by five soil series which are noted for their sandiness. (See Table III for general descriptions) The most important of these are the Norfolk sands which occupy 75 per cent of the area and support more than three-fourths of Florida's citrus industry. Outside of the citrus belt they are used mainly for special crops such as watermelons, tobacco, peanuts and for forestry. The Norfolk series is followed in order of decreasing importance by the Blanton, Orlando, Eustis and Ft. Meade series.

The Blanton soils because of their low position are generally too cold for citrus but in localized areas where protected against frost damage they are quite as good as the Norfolk soils. The Orlando soil is perhaps the best general purpose soil of the five, being used for citrus and truck in the citrus section and for truck and general farm crops in other parts of the area. The Ft. Meade series is about as good as the Orlando as a general purpose soil but is less desirable for citrus because of its high frost risks. The Eustis soil is used mainly for citrus for which it is generally regarded as slightly more desirable than the Norfolk.

TABLE I

SOME IMPORTANT CHARACTERISTICS OF THE RED AND YELLOW SANDY LOAMS OF NORTHWEST FLORIDA.

Color Characteristics	Consistence & Texture of Subsoil		
	Friable sandy clay.	Heavy friable sandy clay	Brittle or heavy plastic clay
Gray surface, grayish-yellow or yellow subsurface, yellow subsoil	Norfolk	Marlboro Tifton	Susquehanna Gilead
Brownish-gray surface, yellow or yellowish-brown subsurface, reddish-yellow or yellowish-red subsoil	Ruston	Faceville	Cuthbert
Grayish-brown surface, yellowish-brown or brownish-yellow subsurface, red subsoil.	Orangeburg	Magnolia	Luverne
Reddish-brown surface, brownish-red subsurface, red or dark red subsoil.	Red Bay	Greenville	Akron

Yellow ↕ Red

Light ←→ Heavy

TABLE 2

COLOR CHARACTERISTICS OF THE RED AND YELLOW SOILS OF THE CENTRAL FLORIDA HAMMOCK AREAS

Series	Surface	Subsurface	Subsoil
Fellowship	Dark Gray	Yellowish-gray or brownish gray	Gray, yellow, brown & red mottled
Hernando	Gray or grayish - brown	Grayish-yellow to yellowish-brown	Brownish-yellow or yellowish brown
Gainesville	Brownish-gray or grayish brown	Yellowish-red or reddish brown	Reddish-brown

•

TABLE 3

COLOR CHARACTERISTICS OF THE RED AND YELLOW SANDS OF FLORIDA

Soil Series	Surface	Subsurface
Orangeburg	grayish-brown	red
Ruston	brownish-gray	yellowish-red
Eustis	brownish-gray	yellowish-red
Norfolk	gray	yellow
Blanton	gray	gr. & yel. or pale yel.
Orlando	dark gray	yel.-gr. or gr. yel.
Ft. Meade	dark gray	yel. gr. or br.-gr.

5. The Knolls of the Clay Flatwoods

There are two minor Yellow sandy loams—Dunbar and Eulonia—which occupy slightly elevated areas within and adjacent to the clayey flatwoods of North Florida and gentle slopes in the Red and Yellow sandy loam area of Northwest Florida. They are similar to the Norfolk sandy loams but differ from them in that drainage is not as well established in the former. The Eulonia has a heavy semi-plastic subsoil while the Dunbar has a friable subsoil like that of the Norfolk sandy loams.

The intrazonal soils of Florida are represented by the Ground Water Podzols, Half-Bog and Bog soils.

III. THE GROUND WATER PODZOLS

The Ground Water Podzols occur in the flatwoods where they are intimately associated with the slightly lower Half-Bog soils. They have developed on marine deposits of sands and clays.

The Ground Water Podzols, commonly known as "hardpan" soils are characterized by light gray, gray or dark gray surface layers over light gray or white subsurface layers over black or dark brown subsoils. The subsoils grade below into white sandy parent material. These soils are acid to strongly acid throughout the profile. This great soil group which includes more than half of the flatwoods, is represented by only two soil series—Leon and St. Johns—and these by only the sands. The two series are distinguished by the color of the surface layers. In the Leon soil the surface layer is light gray or gray while in the St. Johns it is dark gray.

IV. THE HALF-BOG SOILS

The Half-Bog soils occupy an intermediate position in the poorly drained flatwoods where they are associated with the slightly higher Ground Water Podzols on the one hand and the slightly lower Bog soils on the other. Most of the soils in this great soil group have developed on marine deposits of sands and clays but some of them have been derived from or influenced by marls.

The Half-Bog soils are characterized by gray, dark gray or black surface layers over light gray, yellowish-gray or grayish-yellow subsurface layers over yellow and gray mottled or bluish gray subsoils. With the exception of some of the marl soils they are acid to strongly acid.

1. The Clayey Flatwoods

In the upper reaches of the St. Johns valley and in smaller areas elsewhere, are found three poorly drained sandy loams which have heavy plastic clay sub-soils. These three soils may be easily distinguished from each other. The Bladen soil has a gray surface while the Bayboro soil has a dark gray or black surface. The Coxville soil has a gray

surface like that of the Bladen but differs from it and the others in having red mottling in the subsoil.

Another group of three sandy loams occurs in small areas widely scattered throughout the flatwoods. They have friable or slightly sticky sandy clay subsoils. The three members are distinguished by the color of the surface and subsurface layers. The Portsmouth soil has a dark gray or black surface while Plummer has a light gray or gray surface. The subsurface layers of both Plummer and Portsmouth are light gray. The Scranton soil differs from the Portsmouth in having a yellowish-gray or grayish-yellow subsurface.

2. The Sandy Flatwoods

By far the greatest part of the Half-Bog soils are sandy. These sandy soils may be placed in four series. The Portsmouth soil has a dark gray or black surface over a light gray subsurface. The other three are similar to the Portsmouth but may be easily distinguished by comparison. The Hyde soil differs in that the dark surface extends to a depth of 18 inches to 2 feet. The Plummer soil differs in that the surface is light gray or gray. The Scranton soil has a yellowish-gray or grayish-yellow subsurface.

3. The Marl Hammocks

Near either coast and along some of the streams in the peninsular section of the State are narrow strips of what are known as Marl Hammocks. The soils in these areas have been derived from or influenced by the marl formations which occur at depths usually within four feet of the surface. Up to the present time only one soil series—Parkwood—has been established to represent this condition. However, it seems that at least three well-distinguished soils may be found in the area. One of them has a heavy black surface which extends downward to a depth of two or three feet. Another has a gray or dark gray surface over a light gray subsurface which passes into a dark brown or yellow, gray, and brown mottled clay. The clay layer is 2 to 18 inches thick and rests upon marl. The third soil has a gray or dark gray surface which passes directly into marl at depths of from 8 to 12 inches.

V. THE BOG SOILS

The Bog soils occur in the Everglades, Istokpoga Marshes, St. Johns Marshes, and in numerous other marshy and swampy areas throughout the peninsula. They consist of plant remains in various stages of decomposition, commonly mixed with small amounts of mineral material. These soils are usually acid to strongly acid when developed out of immediate contact with lime in some form, but most of those in the Everglades are only slightly acid or even neutral, due to the prevailing marl or limestone upon which the organic deposit has been formed. These soils have not been definitely classified into series. They are called muck, peaty muck or peat depending

upon the stage of decomposition. Muck is well decomposed, usually black. Peat is only partially decomposed and is usually brown. Peaty muck is an inseparable mixture of peat and muck.

The Azonal soils are represented in Florida by the Dry Sands, Lithosols, and Alluvial soils.

VI. THE DRY SANDS

The Dry Sands occupy the excessively drained sandy ridges of the peninsula and dunes along the beaches. They consist of almost pure sands.

There are four soil series in the area. The St. Lucie has a thin light gray surface over a white subsurface which extends to depths of four or more feet without change. The Lakewood differs from the St. Lucie in that the subsurface is yellow at depths below 12 to 24 inches. The Dade differs from the St. Lucie in that the subsurface layer rests upon limestone at depths of 12 to 36 inches. The Palm Beach soil consists of gray and brown sands mixed with fragments of small sea shells.

VII. THE LITHOSOLS

The Lithosols are confined to comparatively small areas near the southern tip of the peninsula and the Keys. They consist of what is commonly known as "rock land" or "pine land" and "marl".

The Rockdale series consists of limestone with numerous small surface cavities filled with red to reddish-brown sandy loams and silt loams or gray to grayish-brown sands. This soil is neutral to slightly alkaline.

The Perrine series consists of light gray, very finely divided marl (calcium carbonate) mixed with variable amounts of sand and organic matter. Possibly several new soil series will be established on the basis of organic matter or sand content when these areas are surveyed in detail.

VIII. THE ALLUVIAL SOILS

The Alluvial soils occupy stream bottoms which are subject to overflow. Since these soils are of little importance in Florida, they will not be discussed here.

The foregoing discussion of Florida soils has been based on information gained from detailed surveys conducted by the Soil Survey Division of the United States Department of Agriculture and from

reconnaissance surveys by the College of Agriculture of the University of Florida. Only about one-fourth of the State has been covered by detailed surveys, however, and most of these are now obsolete due to marked improvement that has been made during the past few years in the techniques required in this work. In any event, the reports and maps are now out of print for the most part and no longer available at any price.

Some of the most notable aspects of the modern development of the soil survey are the use of highly accurate aerial photographs as base maps, insistent emphasis on the utility of the survey which has encouraged the grouping of minor separations and the inclusion of such highly pratical information as slope (from the standpoint of cold drainage as well as water drainage and related soil erosion implications), land cover and degree of erosion where this is a factor.

This means that we are woefully lacking in information on the distribution of our soils with the exception of Lake and Polk counties where the surveys are sufficiently modern (1923 and 1927 respectively) to serve present purposes. Even these two reports already are practically out of print. In view of the basic value of the soil survey for all types of agricultural research and planning and for many other purposes such as equitable tax assessment, road planning and construction and rural zoning and in view of the limited cost of such a survey, it would appear difficult to find a more worthy purpose for the expenditure of public moneys than for the development of such surveys. Since such information is so essential for the development of effective programs in agricultural research and extension, it is our hope as public workers, that the soil survey program in Florida may be energetically resumed and expanded to include the entire State as rapidly as possible. Soil surveys are under way at the present time in Alachua and Collier Counties though entirely without benefit of assistance from the State other than the cooperation of Experiment Station workers in organizing the programs in the County and the assistance of the County organization in defraying the field expenses of the Federal workers engaged in doing the work.

Methods and Limitations of Soil Analysis

•

R. A. Carrigan

•

In view of the increasing popular interest in methods of soil testing, it has been thought that there might be some demand for a discussion of this field from the standpoint of its application to questions of soil fertility. The direct study of fertility is not the only object of Soil Science. It is however, the principal concern of the soil chemist, representing, as it does, the most important application of soil studies to agriculture. The following discussion will therefore be devoted entirely to the application of analytical methods to the evaluation of soil fertility.

Total Analysis

When it was first recognized that continued cropping may leave the soil deficient in certain essential plant food constituents, the most obvious procedure for studying these deficiencies was to analyze the soil. One's first inclination might be to determine the total quantity of each essential element present in the soil, in other words, to run what is known as a total analysis. By a total analysis we do not necessarily mean that all constituents present are tested for—so as to get a series of percentages that will add to 100%—but only that in the case of each element that is tested for, the total amount of that element present is determined. In carrying out an analysis of this kind, a finely ground sample of the soil is mixed with powdered sodium carbonate and the resulting dry mixture is melted in a platinum crucible by heating to bright redness. This drastic treatment attacks the minerals of the soil in such a way that the total quantities of substantially all the non-volatile elements present, except silica, can be brought into solution by subsequent treatment with acid. The undissolved silica can be weighed and the elements in solution, namely iron, aluminum, calcium, magnesium, manganese, phosphorus and others can be determined by the conventional processes of chemical analysis. Incidentally, sodium and potassium have to be determined by a different procedure, which is, however, similar in principle to that of the main analysis.

As already pointed out, this type of analysis reveals the total percentage of each element present, irrespective of the forms in which it may occur, with certain minor exceptions. The system of analysis employed is the result of years of work by chemists in many parts of the world and is universally recognized as being capable of giving results of an accuracy quite satisfactory for most purposes. Because of the involved series of laboratory operations necessary, the method is rather cumbersome and very time-consuming and can be successfully handled only by a skilled operator working in a well-equipped laboratory. The expense involved is accordingly too great to permit very extensive use of this type of procedure in routine analysis.

Let us see, however, what kind of information a total analysis can give us. Consider a soil containing a total of 0.20% potash. This is equivalent to 4000 pounds per acre. Suppose an application of 1000 pounds per acre of a fertilizer containing 5% of potash were found to be justified on this soil. The quantity of actual potash applied would then be only 50 pounds per acre. Yet the original soil containing 4000 pounds per acre was in need of potash fertilizer. The example given here is entirely plausible, conservative, in fact. In this case, a total analysis would reveal 4000 pounds per acre on the unfertilized soil and 4050 pounds per acre on the fertilized soil. As a matter of fact, it would be extremely difficult if not impossible, to run a total analysis accurately enough to show this slight difference. Were it possible, the figures obtained would obviously be of little or no value, since the 50 pounds added in the fertilizer was infinitely more important to the crop than the entire 4000 pounds originally in the soil. The situation just outlined results from the fact that the 4000 pounds of potash in the original soil occur mostly in the form of compounds which are relatively insoluble in the soil water and largely inaccessible to the plant for this reason. The potash in the fertilizer, however, is added in the form of easily soluble compounds which can be readily assimilated by plants.

The above illustration has been presented simply to exemplify the fact that knowledge of the total quantity of a plant nutrient in the soil would be altogether inadequate as a guide in planning fertilizer applications. What is needed is a means of estimating only that part of the total supply of any given element which is or may readily become soluble in the soil water.

There is no intention of implying that the method of total analysis should be unreservedly condemned for use in the study of the soil. This type of analysis has a definite place in research in the comparison and classification of soils, in studying the natural processes of soil formation and as an aid in understanding certain properties of the soil.

Determination of "Readily Available" Plant Nutrients

We have seen that a total analysis does not correlate with the capacity of a soil to supply the plant food constituents. It is natural, then, that we should inquire whether or not it might be possible to find an extracting solution which would have the power to dissolve the various plant nutrients from a sample of soil to an extent comparable with the ability of a plant to assimilate these elements from the same soil. In other words, our object would be attained if we could devise a solution which, in its solvent action on the essential plant nutrients, would duplicate the feeding power of the plant. If a sample of soil were shaken in contact with such a solution, the more soluble constituents would pass into solution leaving behind the relatively insoluble forms undisolved. The resulting extract could then be filtered from the mass of soil and analyzed for its content of plant nutrients. An analysis of this kind, if it accomplished all that was

expected of it, would give us the desired information regarding the fertilizer needs of our soil. This system of analysis has, indeed, assumed great importance in the investigation of soil fertility. The method is, however, subject to limitations which are not apparent in the light of the preceding discussion.

Before proceeding further, it is probably advisable to define two of our most commonly used terms.

(1) Availability. When we speak of a certain quantity of an element as being "available" we mean that that quantity of the element is present in forms of chemical combination which are more or less readily soluble in the soil water and therefore may become accessible for the use of the plant within the immediate future. There is no sharp distinction between "available" and "unavailable" forms in many cases. These terms have meaning only in a comparative sense.

(2) Base Exchange. The property of base exchange is one of the most typical characteristics of soils. This property resides in the finely divided clay and organic matter. The latter two materials are able to hold certain basic elements such as potassium ("potash"), calcium ("lime") and magnesium in a loose form of combination from which they may be readily displaced by chemically similar elements occurring in the soil solution. This process of replacement is a simple act of exchange. Thus an atom of potassium, in solution in the soil water, may displace a sodium atom from a clay particle. The potassium atom then takes the place formerly held by the sodium atom and the sodium atom passes into solution. The two atoms merely exchange places. The same potassium atom might in turn be displaced by an atom of some other basic element. Moreover, the process of exchange between two elements may operate in either direction. For any given soil, the direction in which the exchange takes place is governed in part by the composition of the water solution in contact with the soil particles.

Elements which are held by the soil in this way are said to be in the "exchangeable" or "replaceable" form. The process of replacement is known as "base exchange" and is of importance in the case of potash, calcium, magnesium, ammonia nitrogen and other elements as well. The nutrients held in the soil in exchangeable form are commonly considered to be available for use by plants, since they are only retained in a loose state of combination with the soil particles. However, all of the "available" nutrients are not necessarily held in the "exchangeable" form. For example, the phosphorus in freshly applied superphosphate is readily available simply because it occurs in a soluble form.

We can now return to our consideration of methods of determining the quantities of available nutrients in the soil by the use of extracting solutions. It is evident that the really essential feature of any such method is the extracting solution used. The problem of devising appropriate solutions for this purpose has been studied since 1845. In this year Daubeny proposed the use of carbonated water,

a solvent which has since been advocated by more recent investigators on the ground that it approximates the solution surrounding the feeding root hairs in the soil, which itself is highly charged with carbonic acid given off by the roots. Dyer, in 1894, proposed 1% citric acid, since this strength of acid approximates the acid content of an average plant sap and was therefore expected to imitate the action of plant roots on the soil. Some workers have used N/200 hydrochloric acid, claiming that this strength of acid dissolves from the soil quantities of plant nutrients corresponding to the amounts removed by an ordinary crop. Fraps, in Texas, has advocated 0.2N nitric acid for determining available phosphorus, a recommendation which is based on his observation that this acid dissolves completely the phosphates of calcium which are believed to furnish available phosphorus, and exerts but little action on the phosphates of iron and aluminum which he considers to be relatively unavailable. Pure water and even alkaline solutions are sometimes used.

These examples are presented to indicate the range of variation in the solutions employed and in the reasoning governing their selection. Various others, too numerous to mention, have been advocated by different investigators. Most of these solutions contain a small concentration of acid, the function of which is the decomposition and resulting solution of the more easily attacked compounds of the nutrient elements. In many cases neutral salts are added to aid in controlling the pH of the solution or to confer the base exchange property on it. There is a widespread feeling that the determination of the exchangeable potassium, calcium and magnesium gives about as reliable an indication of the immediately available supplies of these elements as can be expected in the present state of development of soil analysis. For this determination, a solution of a "neutral" salt such as ammonium chloride or preferably ammonium acetate is used.

It appears from the foregoing remarks that there is only limited agreement among soil chemists in regard to the selection of suitable solvents. This fact, though, is merely indicative of the difficulties involved. The availability of a nutrient in the soil is affected not only by its solubility, but by the rate at which it actually dissolves, and by the rate at which it may be absorbed by the plant. The availability is in some cases diminished by the presence of other materials in the soil which have the property of slowly "tying up" considerable quantities of originally soluble material in insoluble forms. The actual quantity of a given nutrient taken up by the crop is the net result of the operation of these and other conflicting factors. Yet in running an analysis we attempt, in a single laboratory operation, to evaluate all these factors in terms of a single number. Fortunately, however, the one factor of solubility (or replaceability) probably dominates the results in the larger number of cases. Hence, on studying data obtained by certain of the methods in use, we find a reasonable degree of correlation between the test results and crop response to fertilization. As a result of the operation of the disturbing factors referred to, how-

ever, irregularities are rather common, even with methods that have attained a measurable degree of success.

On comparing several of the extracting solutions in current use, wide differences may be noted in the quantities of a given plant nutrient extracted from the same sample of soil. For example, suppose two different solvents differing markedly from each other in acid content are used for determining available phosphorus in a series of three soils. Results somewhat as shown in the adjoining table would be entirely plausible.

Soil No.	1	2	3
Phosphorus extracted by strongly acid solvent, lb./acre	100	200	300
Phosphorus extracted by weakly acid solvent, lb./acre	10	20	30

At first sight it might appear that the data obtained by one or the other of these methods must necessarily be erroneous. Certainly the prospect of calculating a fertilizer formula from either of these sets of figures does not look promising. On the other hand, soil No.2 shows twice as much available phosphorus as soil No. 1 by either method. A similar relation holds for soil No. 3. Thus, regardless of which of the two solvents is used, we get the same picture of the relative amounts of available phosphorus in the three soils. The absolute magnitude of the figures obtained is unimportant provided that the test can faithfully reveal significant **differences** between different levels of nutrient concentrations in the soil. From this standpoint the two solvents in the above discussion would be equally satisfactory.

In using a soil analytical method the most vital question of all is that of whether the test results actually mean something in terms of crop yields or other plant response. The ultimate criterion of the adequacy and availability of nutrients in the soil is to be found in the growth and condition of the crop. A method of analysis for available plant nutrients becomes of value, then, only when it has been shown to give results which correlate with the fertilizer needs of the soil as determined by the response of the crop to fertilization.

Nothing that has been said here is intended to imply that soil analysis can supplant practical experience. Probably the most rational view is to regard soil testing as a potentially valuable aid to be used only as supplementary to practical experience, that is, to use it as a guide in forming judgments which otherwise would have to depend on experience alone. A method of analysis can reach its maximum usefulness only in the hands of an intelligent worker who has full knowledge of local conditions together with experience in the interpretation of the test, under these conditions. Valid conclusions can be drawn only when due consideration is given to all factors which may affect the interpretation of the test. Soil type and the kind of crop to be grown are of vital importance in this connection.

Soil Reaction (pH)

The determination of pH is one test which we can justly regard with some degree of satisfaction. The fundamental importance of soil pH in practical agriculture is unquestioned and the application of this test has undoubtedly resulted in far-reaching benefits. Fairly satisfactory methods exist for the determination of this property and the interpretation of the test results is reasonably well understood for a number of soils and crops.

The glass electrode method is generally recognized as being the most satisfactory, at least from the standpoint of accuracy. The quinhydrone electrode can, however, be used with satisfaction if certain exceptional soils are excluded. Unfortunately, the latter two methods require rather expensive electrical apparatus. In the absence of this equipment, colorimetric methods can be used on a great many soils, if proper working conditions are adhered to.

Lest it be implied that investigators have approached a stable viewpoint in their understanding of soil pH and its application, it is perhaps desirable to indicate briefly the direction which experimental work in this field is taking.

Customary practice in determining pH involves agitating the sample of soil with water and running the actual pH test on the resulting soil-water suspension. Dilution with water has been necessary in the past since the conventional electrodes available have been serviceable only in fluid mixtures. For avoiding the error inherent in diluting the soil with water, the use of a new spear-type glass electrode has been suggested by McGeorge (1). This is a rugged type of electrode which can be pressed directly into the moist, undiluted soil or into soil which has been moistened with a minimum proportion of water. Readings taken in this way have been assumed to give indications of the pH of the soil under actual field conditions more accurately than can be obtained by the conventional procedure.

Another interesting development has been the study of the effect of root hairs on the pH of the microscopic layer of soil water in their immediate neighborhood. By working with electrodes having microscopic dimensions Sekera (2) has shown, for example, that in a soil where the pH of the prevailing soil solution is about 6.0, the pH in the layer of water in immediate contact with the root hairs may be as low as 4.9, due to evolution of carbon dioxide by the root hairs. This observation would tend to indicate that plants actually draw their nourishment from a solution having a pH which is not necessarily that of the soil solution as a whole, as determined by our present methods.

These examples have been presented to indicate in what manner further extension of our knowledge in this field may result in improvement both in methods and in interpretation.

---

(1) McGEORGE, W. T., Jour. Am. Soc. Agron. 29, 841 (1937).

(2) SEKERA, F., quoted by KUBIENA, W., in "Micropedology", Collegiate Press, Ames, Iowa (1938).

The Spectrograph

Increasing recognition of the importance of the trace elements in practical agriculture has resulted in the application of the spectrograph to the routine analysis of various agricultural materials. Since these elements occur in minute quantities, their determination by chemical procedures is often attended with considerable difficulty and at great expense for labor and materials. The advantages of the spectrograph have been particularly evident for this type of analysis, since by its use, the certain detection of minute traces of many elements can be affected much more rapidly and economically. In the case of numerous elements, the spectrograph can detect the presence of smaller quantities than can be found by chemical procedure. Perhaps a brief explanation of the principle of operation of this instrument may be in order.

Light is believed to be transmitted through space in the form of a continuous series of waves. Differences in color are due to differences in the length of the waves, measured along the direction in which the light is travelling. Violet light consists of relatively short waves. Red light has nearly twice the wave-length of violet light. White light results from the mixture of all colors, ranging from the shortest violet waves through blue, green, yellow, and orange up to the longest red waves. White light becomes separated into all of its component colors by passing through a prism, which in its simplest form is merely a triangular block of glass. In going through the prism the light rays are bent to one side. Since the shorter wave-lengths are bent more than the long ones, the violet light is found to be separated from the red light. If the separated white light after passing through the prism, is allowed to fall on a white surface, there will be observed a continuous band of color with violet on one end and red on the other, the remaining colors falling in between in the order named above.

Now when any substance is raised to a high temperature it gives off light. The light given off may consist of various wave-lengths but in the case of an incandescent gas the actual wave-lengths emitted are characteristic of the chemical composition of the substance. When cooking on a gas stove, we may often notice irregular patches of flame which glow with a characteristic yellow light. This yellow color is due to the presence in the flame of vapors of the metal sodium which has been spilled on the burner in the form of common salt (sodium chloride). Compounds of potash under similar circumstances give a violet color; barium compounds give a green; and strontium compounds, a red color. In each case the color is due to a particular wave-length of light. Under certain conditions the appearance of these colors can be used for identifying the elements named simply by direct observation with the eye while holding a particle of the unknown material in the hottest part of a flame. This is, of course, impossible when numerous chemical elements are present in the same sample. With the aid of the spectrograph, however, the various wave-lengths can be separated and each one identified.

In doing this, the sample of material—which may be soil—is placed in a crater in the lower carbon of an arc light. The arc is turned on and in the intense heat the entire sample vaporizes, each chemical element present emitting its own characteristic wave-lengths of light. This light is allowed to fall on an opening in the form of a very fine vertical slit between two jaws of metal. If a camera were placed immediately behind this slit, there would be obtained on developing the photographic plate, nothing but a single short vertical line, the image of the illuminated slit. In the spectrograph, however, a prism is interposed between the slit and the photographic plate. As explained above, the prism separates the various wave-lengths of light so that instead of one single image, there results a horizontal row of short vertical lines. Each of these lines is an image of the slit, but each line corresponds to some definite wave-length of light emitted by the incandescent vapors of a definite chemical element in the arc. From the exact position of any given line it is possible to determine what chemical element gave rise to that particular wave-length by comparison with the lines produced by all the known elements. In this way it is possible for one who is thoroughly familiar with the various spectrum lines, as they are called, to identify the elements present in a sample.

To determine actual quantities present, the photoelectric cell is used. With its aid it is possible to measure the intensity of blackening of any given line, a quantity which is related to the amount of the element present. If, in analyzing a soil by this method, the soil itself is placed directly in the arc, then obviously a total analysis is obtained. If an analysis for available percentages is desired, resort must be had to the use of an extracting solution, as described above. The spectrograph may also be applied, however, to the analysis of the resulting solution.

Field Kit Tests

The methods discussed in the foregoing paragraphs have, in the main, legitimate application in the investigation of soil fertility and are representative of procedures employed in the various research institutions engaged in this field of study. Although opinions may differ as to interpretation, the definiteness of the information secured can be depended upon. In the conduct of a research program, where so much depends on the reliability of the data secured, the use of reasonably standardized laboratory methods is a matter of necessity.

There has arisen, however, a demand for a rough and ready system of soil testing for use in the field by workers without particular training in laboratory technique. In response to this demand, several field kits for so-called "quick testing" have appeared. In adapting a laboratory method for field use, the obvious requirement of effective simplification of procedure necessarily places decided restrictions on the precision obtainable. It remains to be seen just how

serious this limitation may be in the use of the field kit. Thus, the extent to which these kit tests might be generally applicable under Florida conditions must await the accumulation of further experience.

SUMMARY

The determination of the total percentage present does not give definite information regarding the availibility of a given plant nutrient in the soil.

Approximate knowledge of the availibility of a nutrient may be gained by determining the amount of it soluble in certain solvents, subject to the limitation that the test results be not too literally interpreted. Data obtained in this way should ordinarily be understood to have meaning only in a comparative sense.

The determination of soil pH by present methods is generally recognized to yield information of immediate practical value, although further studies of this test give promise of materially extending its usefulness.

A rough explanation has been given of the principles employed in the use of the spectrograph. The applications of this instrument in agricultural research have been pointed out.

EDITOR'S NOTE: The numerous questions asked from the floor following this general discussion of methods of soil analysis were indicative of the genuine interest that exists in this subject; also of the rich field of endeavor which the Committee on "Methods of Analysis" has for its very own.

The Soil and Water Conservation Problem in the Everglades

•

Dr. R. V. Allison

•

I am sure we all regret very much that Mr. Herman Gunter, our State Geologist, could not find it possible to be with us today to outline the intimate relation of the field of Hydrology to Soil Science and to Florida agriculture, and to point out some of the more important problems in this field with which we are confronted practically every day.

Our consciousness of the importance of a better understanding of the duty of water and its relation to the soil as well as to the plant has developed rapidly here in Florida during the past few years especially as these relationships have to do with the movement of soil water and the availability to the roots of growing plants of a proper supply of this vital solvent at all times. As we get into the problem, however, we quickly come to the realization of how dangerously little we know even about the relationship of this dynamic, soil-water cycle to the stability and effectiveness of the soil fertility complex as expressed in the ordinary growth of plants. Florida is a flat country with notably high and low seasonal rainfall, a country of fires at one time and floods at another. What she needs is a happy middleground between the normal trend of these two extremes and this can be attained only by intelligent study and planning followed by methodical management and control.

Inasmuch as there are few, if any other, persons in the State with sufficient basic knowledge of our water resources to cover this question in the breadth of its original statement, and in the manner in which we hoped Mr. Gunter would treat it, and since your Chairman gave his prior promise to say a few words on some phase of the subject in the event he could not be present, I should like to discuss with you, in a preliminary sort of way, what long has been regarded by some of us as one of the most important hydrological problems to be found in this or any other State. Reference is to our great need for a comprehensive soil and water conservation program for the Everglades.

In referring to the Everglades conservation problem as basically hydrological and primarily of a water control nature it is necessary to understand, first of all, something of the genesis of the Everglades soils.

In the first place the peat and muck soils blanketing the vast expanse of this great area were formed almost entirely from sawgrass in the presence of an excess of water, probably a condition of partial to complete inundation most of the year, just as other organic soils of this nature have been formed. This should not be taken to mean that there were not periods of low water table and even drought in the course of the passing centuries that have witnessed the formation

of these soils. Charcoal and ash in the deeper layers of the soil profile in several sections tell us that there were deficiencies of moisture and extensive fires from time to time. Nevertheless, the predominant influence has been water. Otherwise there would have been no appreciable accumulation of plant material in the form in which we find it and which constitutes the body proper of these remarkable soils.

Furthermore, the topography of the supporting foundation material upon which the Everglades deposit has developed, consisting of porous lime rock, marl or sand, is not of the nature of a closed basin but rather of a broad, open trough about 50 miles wide. This extends essentially from Lake Okeechobee on the North to Cape Sable on the South, most of the way between low land elevations to the east and west only a few feet higher than the surface of the Everglades itself. The average gradient of the surface, southwards, is little more than two inches to the mile. In its undisturbed condition, therefore, the Everglades was a vast, unbroken plain of gray-green sawgrass as far as the eye could reach.

Lake Okeechobee, lying at the head of the Everglades, also serves as a great, shallow basin at the foot of the Kissimmee Valley. Thus, we have the three components of an immense hydrologic unit, (1) The Kissimmee River, and numerous smaller streams (the watershed), (2) Lake Okeechobee (the storage basin) and (3) The Everglades (the overflow area), all of which shall have to be taken into careful account in planning a soil and water conservation program for the area as a whole.

Just as the soils of the Everglades were formed by the grace of an abundance of water, so are such soils destroyed by injudicious drainage operations that are not followed up with proper protective measures. This has been the tragedy of the Everglades. For the past quarter century a large scale drainage development has served only to dewater vast areas, much of which under the best possible conditions of agricultural expansion would not be needed for many decades to come. What is the result in the meantime? Sheer destruction. Catastrophic fires have swept over the area nearly every winter (the dry season) that have not only destroyed immense potential soil values but also caused undue hardship to plant, animal and human life that happened in the way of the biting flames or billowing clouds of acrid smoke.

Aside from actual burning, the oxidation and shrinkage of such soils when exposed in this way takes an even greater toll. Thus, shrinkage alone, as a result of air drying, of an excavated profile from sawgrass soil four feet long, nine inches wide and six inches deep showed a reduction of about four volumes into one! Under natural conditions in the open glades four miles south of the Bolles Canal where there has been no cultivation whatsoever, careful measurements have shown a surface subsidence of 3.45 feet, or about one third of the original depth of the peat. (1) It is found to be appreciably greater near the large canals, as might be expected. With the incidence of fire, almost any loss might be experienced in a single season from the burn-

(1) See Figure 22, Page 56.

ing of only the plant cover and accumulated surface debris on down to several feet of the soil body itself. All of this, of course, is independent of the progressive surface subsidence of these soils that accompanies cultivation. Following the first breaking, the loss of elevation is quite rapid due, in good part, to physical compaction in forming a denser soil body. Then it slows up quite appreciably. How to slow down this subsidence or bring it to a complete halt after a reasonable period of cultivation is the vital question in the continued use of soils of this nature. The principal answer must always be in the proper handling of the ground water in relation to crop rotations that are developed with this all-important objective in view.

Inasmuch as the technique of conservation is necessarily different under cultivated and uncultivated conditions, the Everglades problem might well be divided into two parts on this basis for clarity of discussion and understanding.

(A) Lands that are definitely under cultivation or located within a sub-drainage unit and available for cultivation at any time, and

(B) Lands outside of sub-drainage districts and a part of the "open", unreclaimed Everglades which comprise nine tenths or more of the total area at the present time.

A. Developed Lands.

In the Everglades proper there are, or were, between two and three millions of acres of organic soils, some of it of great potential value. Of this, approximately 100,000 acres are under cultivation at the present time. Even if an additional area of 100,000 acres were to be placed in use during the next twenty years it is obvious that the great bulk of the area would still remain for development by posterity; that is, if it is not completely destroyed in the meantime by our present program of neglect.

Properly developed and carefully cultivated, the Everglades soils are highly productive. Cane yields during the past season over large fields have been as high as 80 tons or more of cut cane per acre, and sugar yields as high as 9.25 tons. The average for the entire crop for the season now closing is more than 40 tons per acre, with an average sugar content of more than 10.6 per cent. Beans, celery, potatoes, cabbage and many other truck crops are equally responsive. More than a thousand boxes of celery have been produced per acre; more than 35 tons of cabbage, and other crops in proportion. Forage crops for the support of a livestock industry are of particular promise, since, taken in conjunction with sugar cane, they will not only constitute an excellent base for the general type of farming that this country especially requires but also would appear distinctly favorable for a soil of this nature where the highest possible water table should be maintained together with a minimum of cultivated surface exposure, all in the interest of soil conservation through the prevention of surface subsidence.

Accordingly, under cultivated conditions, we need to know more of the effect of cultivation and of water control conditions involved in various systems of agriculture upon the permanence of the soil material itself. Therefore, the planning of water control for cultivated areas must be carefully coordinated with that on the undeveloped areas which should be flooded as much of the year as possible.

B. Undeveloped Lands.

From the above definition of the manner in which the Everglades soils have been formed and the combustible nature of their principal components, it is apparent that the main problems of conservation for immediate attention are in the open, undeveloped sections of the area, which have not been touched by the plow, and for great acreages of which there may not be economic need of development for decades to come.

The fact that there has been a general dewatering of this vast and unused, unattended area of organic soil over the central and lower part of the peninsula for a number of years has created several problems in addition to that of soil conservation which automatically become a part of the project as a whole.

Notable among these are:

1. Overdrainage of the Everglades National Park area and progressive destruction of many of its most important natural features including food resources for wild life.

2. A lowering of the freshwater table under the agricultural areas of the lower east coast from Florida City to West Palm Beach, part of it the most tropical section of the United States, with heavy damage to the productivity of these areas in terms of winter vegetables, sub-tropical fruits and other types of general and specialized agriculture found in the region.

3. A dangerous decline of the recharging action by surface waters over important domestic water supply areas to the west of the metropolitan sections of the lower east coast that is causing real alarm at the present time.

4. A notable effect in producing lower winter temperatures and so setting up this expansive area in the open glades as a great basin of "cold" in the form of night temperatures that are a real menace to agriculture in all contiguous areas. Under conditions of low water-tables in the open glades that have produced a deep layer of dry, combustible material over the surface (following the first frost) and a foot or so of dry, fibrous topsoil, "winter" temperatures as low as 9 degrees F. have been recorded in undeveloped sections!

Thus, over-drainage and excessive dewatering of the open, unused sections of the Everglades have not only stopped the formation of soil by processes that should continue as long as possible but are producing shrinkage and oxidation losses, independent of burning, that are all but incredible. Burning of these soils and soil materials

under such conditions, through the long dry seasons lasting through most of the winter, adds enormously to these losses. The past winter has been one of the worst on record, insofar as physical damage to the Everglades soils is concerned.

There is only one logical answer to all these problems that is at all practical and that is RE-WATERING. That is to say, there should be held on these unused areas not only all the rainwater that naturally falls on them but this should be supplemented, just as far as is found possible and feasible, by water from the original source of overflow, namely Lake Okeechobee. By this means the soils in the sections so flooded will not only be protected against shrinkage, natural oxidation and burning, but the natural processes of soil formation will be reinstated.

Furthermore, the restoration of overland flow of surface waters down the peninsula will reestablish natural values in the Everglades National Park that are vital to the future of that area. Such a re-watered condition of the "back country" also will elevate the natural water gradient under the agricultural areas of the lower east coast, referred to under "2" above, as it finds its way to sea level through the porous subsoil in a manner that should give appreciable relief to that problem. In the same way a flooding of the recharge areas to the west of the metropolitan areas of the lower east coast should bring relief to the domestic water supply problems of that section and take care of any amount of pumping that may be thrown against them at any time in the future. Finally, the establishment of a great, shallow, inland lake of this nature should go far in ameliorating low winter temperatures that have developed in the past out of the de-watered condition of the back country referred to under "4" above, and which will continue to menace the agriculture of the important contiguous areas just as long as the Everglades is handled as it has been during the past two decades.

PROCEDURE

In a problem of this dimension, long range planning must be stressed and every consideration given to all three components of the system, namely, the watershed, the reservoir, and the overflow area. Above all, the needs of the areas that already have been reclaimed should be sharply differentiated from those of the unreclaimed sections on the one hand, and the "permanent water reserve" areas on the other. The fact that the Federal government already has expended more than seventeen millions of dollars in the construction of a permanent, massive dike around certain developed sections of Lake Okeechobee constitutes a truly indispensable beginning in the proper handling of the regional waters involved in this great project. As a matter of fact, it places the entire project on a new and much more feasible plane of consideration than it ever has been on before. This, coupled with the very constructive attitude of the District Office of

the U. S. Engineers charged with the maintenance and operation of these lake control facilities, is one of the most hopeful and heartening signs for the future.

A. Lands Under Cultivation.

The primary need in connection with lands under cultivation is for careful, exacting study in the handling of the ground water under such conditions looking to economic plant response on the one hand and the best possible stabilization of the soil body on the other which will prevent, if possible, at a certain reasonable point, any further surface subsidence, whatsoever. Very careful consideration must be given to water relationships of this nature as between developed and undeveloped areas especially as related to irrigation requirements and drainage operations. In fact this consideration should become the basis of the general plan of development for the Everglades in the future. Such a plan should not only require a unit basis of land development but also must be broad enough and comprehensive enough to envision the handling of the last unit of reclaimable land at whatever time economic conditions may permit such development. When the absolute need for establishing **permanent water resources** as a part of such a plan is fully realized the intriguingly complicated nature of the problem as a whole becomes more evident. The first question then becomes, where should these reserve areas be located and on how extensive a basis should they be planned. This phase of the planning must be preceded by soil and other physical surveys.

B. Undeveloped Lands.

While the problems associated with the proper use of the land under cultivated conditions are exceedingly important, and a great amount of research is still needed in this connection, the most pressing consideration we are now facing is in the proper handling of the great area of undeveloped lands. In other words, it is here that we are experiencing the greatest soil losses and it is the re-watering of the de-watered expanse that should bring such profound benefits as, in part, have been listed above. Accordingly the following steps would appear to be a logical series leading to the organization of a comprehensive plan for handling the Everglades both from the standpoint of proper development and protection of cultivated areas and conservation of the soil and water resources of unreclaimed sections.

1. A comprehensive review and study should be made of all available engineering, meteorological, and other physical data pertaining to all parts of the Everglades area and its environs wherever it may be found, whether in Washington, Tallahassee, Jacksonville, West Palm Beach, Miami, Everglades City, or Clewiston. Although there is an enormous amount of data available at different points and from different sources, no such comprehensive digest and evaluation has ever been made of it to serve as a definite basis for further study and planning.

2. Air surveys should be developed for most of the area not only to serve as base maps for soil and other surveys but also for the assistance they would give in the evaluation of other phases of the work Naturally air surveys of this section of Florida would also serve many other useful purposes.

3. Immediately basic information furnished under "1" and "2" becomes available it will be possible to begin rapidly to fill in missing data by instrument and other surveys to the end that a comprehensive and adequate physical basis for planning will be had.

4. Contemporaneously with the rounding out of the physical survey under "3" above, research and demonstration features of the general project should be planned, some of them necessarily of a long time nature, and put into effect. Such studies and demonstrations should be the outgrowth of an integrated analysis by both State and Federal subject matter specialists from every field of interest that has a bearing on the problems involved.

5. As soon as an adequate system of data for any phase of the general problem is available for the purpose, long range planning should be instituted. Out of this should grow, first of all, a works program for soil and water conservation in the undeveloped sections of the Everglades.

6. Any works program of a permanent nature should be developed as a definite and integral part of the general plan for the Everglades, which plan should be a unit plan and the basis for the development of all reclaimable sections of the area in the future.

7. Contemporaneously with the cooperative development of the physical program and general plan for the future, careful coordination also must be had among Federal, State and local officials from the standpoint of adjusting present conditions of land ownership and tax delinquency as this is a vital part of the problem as a whole.

SUMMARY STATEMENT

The principal problem in the Florida Everglades is that of developing a definite plan of reclamation for the area as a whole. This must be broad enough to supply information on how to improve methods of development and use of these organic soils on the one hand, and on the other, to hold the undeveloped or "reserve" areas under the protective influence of the highest possible water table throughout the entire year. There is no incompatibility between the two procedures or purposes for developed and undeveloped lands, respectively. In fact, they can very definitely and effectively supplement each other. Such a plan furthermore, must be broad enough to encompass the individual problems of all three components of the system, namely, the watershed (Kissimmee Valley), the storage basin (Lake Okeechobee), and the overflow area (Everglades), and so draw them into a closely interwoven schedule of development as a whole.

This problem of the proper handling of organic soils is not by any means peculiar to Florida. It is to be found in practically every state in the Union notably, perhaps, in Minnesota, Michigan, California and North Carolina. There is little doubt that the Everglades area is the most extensive and valuable of all. If a successful project can be organized in Florida, therefore, it will doubtless assist very materially in the development of the peculiar technology required for the handling of this particular type of conservation problem wherever it may be found.

EDITOR'S NOTE: The brief discussion of the Everglades problem outlined above represents an extension of Doctor Allison's remarks that is based in part on a statement on the same subject that was prepared by him only a few days later (April 24) for the record of a hearing before a Sub-committee of the Senate Appropriations Committee in Washington.

The spontaneous discussion from the floor that followed this presentation indicated in a very definite way the widespread interest that exists in this vital problem. This discussion not only involved the problems of the Everglades proper, but those of the various sections of the Kissimmee Valley as well, indicating excellent insight of all participants into the broader aspects of a vital situation that now has been fully opened for public review.

As a result of this active discussion from the floor, the President of the Society was instructed to appoint a standing committee whose object would be to collect, study, and summarize existing data from all available sources, relative to the Everglades problem, the results of its work to be presented in the form of reports at future meetings of the Society together with recommendations for action in the future. This authorization was found to fall well within the framework of the Constitution (Article IV) and a "Soil and Water Conservation Committee" subsequently was appointed, Page 64 of this Proceedings, which has State-wide responsibility in this important field.

NOTE: With the close of this phase of the program, the meeting was adjourned until the following morning when a joint meeting with the Florida State Horticultural Society was scheduled. The total recorded attendance at the organization meeting was 81. A large part of this group subscribed to formal membership in the Society in the course of the meeting or responded favorably to invitations to do so by correspondence within a few days following the meeting when the list was carefully checked.

The photographs that follow show something of the natural conditions in the open, undeveloped Everglades, past and present, some of the reclamation and water control relationships, the possibilities of a considerable range of agricultural plants, including the striking benefits from the use of certain trace elements on the Everglades peat and, finally, the great importance of water control and careful land use planning especially from the standpoint of SOIL CONSERVATION.

FIGURE 1. The "Open" Glades, looking southeast in the direction of Fort Lauderdale through a narrow border of elder along the North New River Canal at a position about 12 miles south of Lake Okeechobee. The land cover reaching to the horizon is the characteristic sawgrass of the Everglades. Note the bank of water hyacinths along the edge of the canal. If not held in check this plant multiplies rapidly and soon clogs the channel.

FIGURE 2. A close-up of "sawgrass" (Cladium sp.) from which the main body of the Everglades soil has been formed. This is an extremely coarse, heavy sedge characterized by strong, siliceous teeth along either margin as well as the back of the midrib. Normally it grew to a height of 8 to 10 feet under the natural conditions of protection that existed in the Everglades prior to general drainage operations. A dense cover of "grass" of this nature was exceedingly difficult and even hazardous to penetrate especially with the facilities for traverse available to early survey parties.

FIGURE 3. Impenetrable growth of "Custard apple" (Anona sp.) that characterized a narrow belt of high grade muck along the south and east shores of Lake Okeechobee prior to reclamation activities. It was on account of the growth of this species, which occurred only on the high grade muck for the most part, that this soil has been known as "Custard apple soil" for many years. In formal soil survey reports it is now being designated as "Okeechobee muck". Photo by Dr. Blatchley of Indianapolis about 1910.

FIGURE 4. A view of the "Lower Glades" in the Everglades National Park area where the sawgrass meets the mangrove, taken from a position on the Ingraham Highway about ten miles north of Flamingo. The soil profile in this location is made up of blue-green algae marl to a depth of about three inches over a three inch layer of peaty muck underlain by about six inches of geologic marl over lime rock.

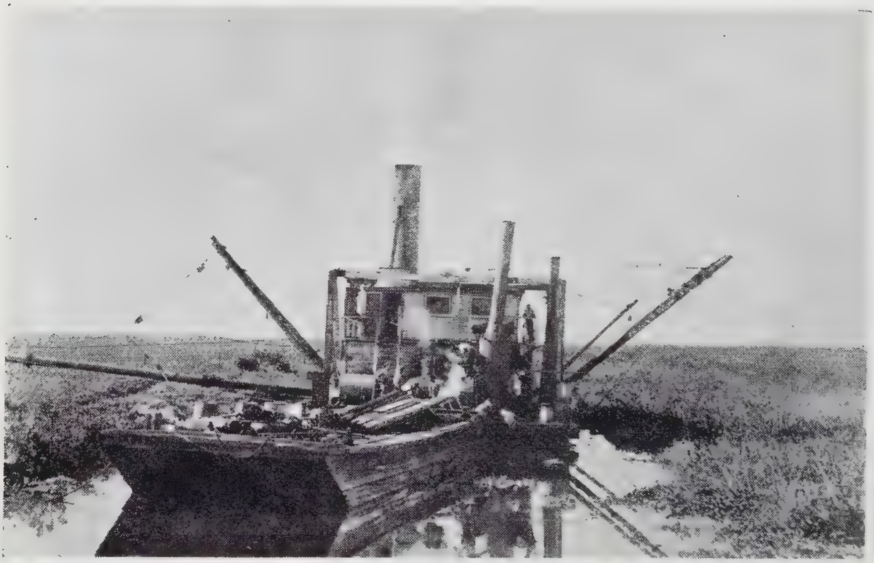

FIGURE 5. An early dredging operation in the open glades, the dredge "Everglades" cutting its way through the deep, wet peat characteristic of the area. Note the absence of any shrub or tree growth whatsoever, entirely to the horizon. Photo taken about 1910 at a position about twelve miles south of Lake Okeechobee by Dr. Blatchley of Indianapolis.

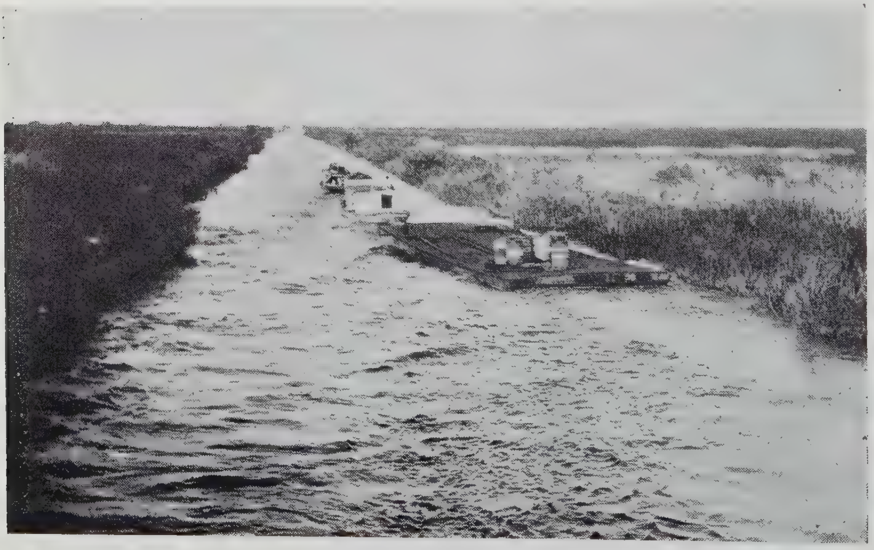

FIGURE 6. Barging supplies into the Lake Okeechobee area through the "South" Canal, during the early days of reclamation. With the development of good highways throughout the region the use of the arterial drainage canals for transportation purposes has ceased entirely. This latter fact will minimize very considerably the cost of an effective program of soil and water conservation in the Everglades since this can be accomplished in the open, undeveloped areas only by restoring the land to its original condition of overflow as much of the year as possible.

FIGURE 7. A natural cover of "pigweeds" in the Lake Okeechobee area characteristic of this and other types of wild growth that quickly occupies the land when cultivation ceases. Such a growth as shown above will develop in the Everglades in six or seven weeks under late Spring conditions.

FIGURE 8. A Storey "Gyrolette" working on the property of the U. S. Sugar Corporation in the deep muck soils of the Upper Glades near Lake Okeechobee. The revolving tines or "plows" stir the soil thoroughly to a depth of about 20 inches without turning it to any appreciable extent. This is proving a valuable operation especially in bringing newly developed land into production. Unnecessary stirring, cultivation and exposure of soils of this nature should be strictly avoided, however, in the interest of conservation.

FIGURE 9. "Moleing" in the muck soils of the Everglades. A torpedo-shaped tool is drawn behind a thin, shoe-like implement at the lower end of the heavy knife that projects into the soil from the rear end of the horizontal beam that is slung midway between the truss wheels. The depth of the "mole" is regulated by the windlass. If carefully done, water control channels (drainage and irrigation) are formed in the soil by this means which are useful for several seasons. The excavated profile (inset) shows the natural opening formed by the mole in the soil and the complete manner in which the cut made by the knife closed (immediately above the opening) after its passage. From the raggedness of the cut midway between the opening and the surface, however, it is evident that the knife had accumulated a considerable amount of refuse across its edge and was shoving it along ahead of it. Note the fibrous character of the peat throughout the profile especially in the lower depths. A) surface of soil. B) Imperfect line of cut. C) Perfect line of cut. D) The mole opening formed in the peat.

FIGURE 10. General view of part of a series of "water table" plots installed at the Everglades Experiment Station while still being planted to a single crop to study the uniformity of the various areas. Eight different water tables or soil moisture controls, including two with overhead spray and one with a fluctuating ground water table, are involved in this study of plant relationships and preferences along with oxidation and subsidence effects upon the soil itself.

FIGURE 11. A section of the Lake Okeechobee dike at the time of planting Bermuda grass to protect its sloping sides against washing. This is a massive structure designed to hold the lake in place under any and all conditions. It is one of the vital keys to a constructive, long-range soil and water conservation program for the Everglades and for South Florida.

FIGURE 12. An air view of the Port Mayaca development on the eastern shore of Lake Okeechobee. Note the lake in the background and St. Lucie Canal (the eastern control outlet) across the upper, right-hand corner flowing towards the Atlantic Ocean. There is here illustrated an excellent system of water control (drainage and irrigation) through the use of dikes and pumps as well as wind control through the use of **Casuarina lepidophloea** as a windbreak.

FIGURE 13. The key to efficient and economic water control in a great, flatland area like the Everglades is to be found in highly efficient, low-lift pumps of the type shown above. Without doubt there has been more and better work done during the past ten years in the improvement of low-lift pumps for use under South Florida conditions than throughout all previous time, with most of the glory for what has been accomplished falling to Messrs. Roy O. Couch and Norman C. Storey of Grant and Miami, Florida, respectively. The installation shown is a reversible panel type at the Everglades Experiment Station.

FIGURE 14. The clogged condition of this canal with water hyacinths and grass suggests the serious problem of canal maintenance for efficient water control that is to be found under the sub-tropical conditions of the Florida Everglades.

FIGURE 15. Response of sugar cane to treatment of the Everglades peat with copper sulfate. The five "Stools" on the right had no treatment whatsoever except "bluestone" at the rate of thirty pounds per acre. The small plant on the left, characteristic of all plants on the "check" plot, received no copper sulfate whatsoever.

FIGURE 16. Response of peanuts to treatment of Everglades peat with the so-called "trace" elements. The central plot, foreground, had a complete treatment, except copper. The plot to the right, with the stake, had the same basic treatment with copper sulfate included. The central plot, back-ground, is a complete check with no treatment whatsoever. Inset, left, check plants with no treatment; right, copper sulfate; center, combination treatment with copper and zinc. The effect of the zinc was to promote an early response to copper and consequently earlier maturity, the plants of the combination treatment being practically mature while those receiving only copper were still in full vegetative growth. Planted May 5; photographed October 31; variety Valencia.

FIGURE 17. Heavy crops of sugar cane are grown on the rich muck soil of the Everglades under proper conditions of water control. Note the heavy cover of cane leaves that remain on the soil in addition to the great mass of new, fibrous roots that develop in the soil each year. The Athey truss-wheel carts in which the cane is transported from the field to the cars for loading carry about five tons each.

FIGURE 18. A pasture cover at the Everglades Experiment Station suggestive of the lush, highly nutritive grasses that can be grown on these organic soils, perhaps with a minimum of drainage from the soil conservation and water control standpoint. The animals in the picture are purebred Devons.

FIGURE 19. A field of snap beans in the Everglades at harvest time. With the development of truck crops in this area at a practical maximum, further reclamation of appreciable acreages in the future shall have to find other types of farming enterprises. From the soil conservation standpoint it is hoped they may require less cultivation and exposure of the soil than is necessary for most truck crops.

FIGURE 20. Castor beans growing under Everglades conditions show considerable promise in this area in connection with the new interest that is developing in this plant. Much remains to be done with this crop in breeding and selection for the purpose or purposes desired.

FIGURE 21. A great fire raging in the open Everglades over a front of twenty-five or thirty miles and about that distance or farther from the camera as viewed from the Everglades Experiment Station looking in the direction of Miami (extreme right) which is about eighty-five miles distant. During winters of exceptional dryness in the past, great sections of the Everglades have burned over, frequently with heavy losses of soil. Smoke and ashes carried to coastal areas from such fires not only have been a source of great discomfort to the entire population but, at times, also have been so heavy as actually to interfere with highway traffic even during the daytime.

FIGURE 22. Surface subsidence of Everglades soil due to oxidation, compaction and shrinkage. According to the benchmark shown in the picture the sea-level elevation of the surface of the land at this point was 18.5 in 1916, when the position was established. In 1932, the time of the photograph, it was 16.1. Other intermediate levels are indicated for 1919, 1921 and 1925. There was no evidence or local record of burning having been involved at any time in this loss. The location is about 4 miles south of Lake Okeechobee along the North New River Canal at its intersection with the Bolles Canal.

FIGURE 23. Another evidence of shrinkage in the muck soils of the Everglades is to be found in the great surface cracks that develop. The above picture was taken from a position on highway No. 25 between Belle Glade and West Palm Beach after a sweeping fire had burned away all dead vegetation and sawgrass. Some of the cracks were found to extend three or four feet into the soil. Note the ash on some of the isolated blocks indicating the soil was burned to a depth of 4 to 8 inches in many places.

FIGURE 24. The complete loss of a levee of considerable cross section by burning indicates a further need for the best possible water control at all times. Note that the soil beneath the levee burned to a considerable depth below the level of the adjacent land.

Joint Session with the Florida State Horticultural Society

Wednesday morning, April 19, 1939

•

The joint meeting was called to order at 9:30 A. M. and was presided over by Dr. H. C. Henricksen, a member of the Executive Committee of both Societies. The papers presented at this meeting are to be published in the Proceedings of the Horticultural Society, which may be consulted for full details. Accordingly, only a brief indication of the content of each paper is given in the following summary of the program.

1. The Cycle of Organic Matter in Soils.

Dr. F. B. Smith, Department of Chemistry and Soils, Florida Agricultural Experiment Station, Gainesville, Florida.

The author outlined the functions of organic matter in agricultural soils and stressed the importance of maintaining an adequate supply of it in the sandy soils of the South. Methods of supplying organic matter are described and evaluated.

2. A Rapid Laboratory Method for the Determination of Exchangeable Magnesium in the Soil.

Dr. Michael Peech, Soil Chemist, Citrus Experiment Station, Lake Alfred, Florida.

A new method for the rapid analysis of soils for their content of exchangeable magnesium is presented. Data are summarized from the analyses of soils collected from 519 commercial groves. The exchangeable magnesium content of the soil, as determined by this method, is shown to be correlated with the presence or absence of "bronzing" of the foliage.

3. The Adaptability of Rapid Laboratory Methods to the Study of Highly Organic Soils.

Dr. W. T. Forsee, Soil Chemist, Everglades Experiment Station, Belle Glade, Florida.

A number of the more common methods of testing soils are without value for the analysis of peats and mucks since the extractants used dissolve such quantities of highly colored organic matter that the usual color and turbidity tests cannot be carried out in the resulting extracts. In this paper, the author presents a system of analysis which has been devised specifically to obviate this difficulty.

4. Florida Citrus Malnutrition Leaves.

G. M. Bahrt, Division of Soil Fertility, Bureau of Plant Industry, U. S. Department of Agriculture, Orlando, Florida.

A description is given of various leaf patterns encountered in citrus species with a discussion of their interpretation as symptoms of known deficiencies in the light of the author's experience through several years of research in this field.

5. Question Box.

R. S. Edsall, Wabasso, Florida.

Mr. Edsall conducted a highly interesting "Question and Answer" session. Maintenance of soil organic matter and corrective treatments for trace element deficiencies commanded the greatest interest in this part of the program.

Committees

•

The chief objective in setting up the subject matter committees provided by Article IV of the constitution is, naturally, the advancement of the whole purpose and work of the Society. This can be done only by keeping the committees as active as possible.

Committees do good and accomplish their purpose not merely by the chairman or various members giving an undue portion of their time to the work, but to a greater extent, it is believed, by having a well thought out plan of action and seeing to it that each member contributes his proportionate share. Accordingly, that chairman is wise who fits his program carefully to the time of his committee members, making sure, however, that the effort of each, no matter how small, contributes in a definite way to the accomplishment of the objective for which the committee was formed.

Inasmuch as some of the most important work of the Society will be developed by the various subject matter committees outlined below it will be an important duty of the Executive Committee to assist the various chairmen in every way possible. At such time as it is impossible for the chairman of a given committee to continue actively in his assignment he should be relieved by the Executive Committee and a new chairman named. Further than this the Executive Committee will depend very largely upon the chairmen of the various committees to report upon the activity of their members and for recommendations as to names to be dropped or new members to be appointed.

The Secretary of the Society will serve as secretary of all committees of which the chairman does not prefer to choose a secretary from his own group.

I. MEMBERSHIP COMMITTEE

Secretary of S. S. S. F.	Gainesville (Chairman)
Mr. Jack O. Holmes	Tampa
Mr. C. D. Kime	Gainesville
Mr. W. J. Adair	Jacksonville
Mr. Hibbard Casselberry	Winter Park
Mr. J. O. Zipperer	Ft. Myers
Mr. John R. Wilson	West Palm Beach

The work of the Membership Committee is exceedingly important to the development of the Society. Its personnel will largely be made up of representatives from other active organizations in the State having a definite interest in soils work. This group will be actively responsible for maintaining the membership and interesting new members in the objectives of the Society.

II. SOIL SURVEY COMMITTEE

Mr. George F. Westbrook	Clermont (Chairman)
Mr. S. H. Bowman	Clermont
Mr. Ernest R. Graham	Miami
Mr. G. W. Lee	Hastings
Mr. Ed. Scott	Everglades City
Mr. Wayne Thomas	Plant City

The most important responsibility of the Soil Survey Committee will be to impress upon the members of our Society in particular and upon the citizens of the state in general, Florida's dire need for an aggressive soil survey program.

The only business-like approach to our soil or land problems from any standpoint is upon the soil survey basis. Defined in the simplest possible terms, a soil survey is little more than a carefully developed inventory which treats individual types of soil as natural objects and classifies them accordingly. Such a survey will show us **what** soils we have, **where** they are in the state and **how much** of each we have, in the aggregate, whether for a given area or for the state as a whole. It is also the only safe and satisfactory basis for grouping soils into classes and studying the "capability" of the land in a systematic and efficient manner.

At the present time satisfactory up-to-date soil surveys and maps are available for only two counties and the editions of both of these are practically exhausted. All other surveys are not only out of date but also out of print and entirely unavailable at the present time. The soil survey is needed as a definite basis not only for our research program in soils but for extension work, land appraisal, land use planning, road building and a wide variety of other purposes as well.

III. METHODS OF ANALYSIS COMMITTEE

Mr. L. H. Rogers	Gainesville (Chairman)
Mr. R. A. Carrigan	Gainesville (Secretary)
Dr. W. T. Forsee, Jr.	Belle Glade
Dr. W. L. Lott	Clewiston
Dr. Michael Peech	Lake Alfred
Mr. R. P. Thornton	Tampa
Mr. G. M. Volk	Gainesville

The state-wide interest that is developing in soil analysis and testing gives the program of this committee a place of immediate importance in the work of the Society. It will be responsible for evaluating methods in current use and recommending new ones from time to time as they become available from one source or another and are found adaptable to our Florida soils. It will doubtless work closely with a similar committee that has been set up in the Agricultural Experiment Station to study methods of analysis for soils and related materials.

IV. TERMINOLOGY COMMITTEE

Dr. Michael Peech	Lake Alfred (Chairman)
Dr. R. V. Allison	Gainesville
Mr. J. R. Henderson	Gainesville
Dr. F. B. Smith	Gainesville
Mr. G. M. Volk	Gainesville

The literature of Soil Science contains a considerable number of terms referring to very practical materials and matters that sometimes are rather difficult for the lay-reader to grasp. By way of example "pH", "base exchange", "soil colloids", "availability" (of fertilizer elements), etc., might be mentioned. It will be the purpose of the Terminology Committee to assemble the most commonly used expressions in this field that seem to be giving the most trouble and prepare a report for distribution to the membership that will furnish a clear, simple statement of the meaning and application of these terms employing simple, graphic means wherever it may be of advantage to do so. It is believed such a presentation will materially assist our public discussion of soil problems since these terms will thereby rapidly become a part of the vocabulary and understanding of all who are sufficiently interested to give them the requisite amount of study. The membership may be canvassed, in part at least, to determine what terms should be considered first.

V. RESEARCH COMMITTEE

Dr. L. W. Gaddum	Gainesville (Chairman)
Mr. W. L'E. Barnett	Mt. Dora
Mr. Clarence Bitting	New York City and Clewiston
Mr. H. C. Brown	Clermont
Mr. R. A. Carlton	West Palm Beach
Mr. Luther Chandler	Homestead
Mr. Stephen Chase	Dunedin
Mr. R. O. Couch	Grant
Dr. Roy Cross	Kansas City, Missouri
Dr. David Fairchild	Coconut Grove
Mr. F. W. Heiser	Fellsmere
Dr. H. C. Henricksen	Eustis
Dr. L. R. Jones	Madison, Wisconsin
Mr. H. I. Mossbarger	Miami
Dr. Wilson Popenoe	Guatemala City, Guatemala
Mr. Waldo Sexton	Vero Beach
Mr. Chas. R. Short	Clermont
Dr. T. M. Simpson	Gainesville
Mr. N. C. Storey	Miami
Dr. J. W. Turrentine	Washington, D. C.
Dr. S. A. Waksman	New Brunswick, New Jersey
Mr. B. F. Williamson	Gainesville
Dr. R. C. Williamson	Gainesville
Mr. Gar Wood	Detroit and Miami

Through the wide contact and diverse interests of the various members of the Research Committee with agricultural conditions over the state and outside of the state, many constructive ideas should be forthcoming as to what is most needed in a soils research program for Florida and how it can be most effectively coordinated with other agencies in the state having interest in this field or in closely allied fields.

Naturally the Research Committee shall have to give urgent support to the Soil Survey Committee and, in turn, expect much from the committee on Methods of Analysis. Many of the other committees of the Society among them, "Soil and Water Conservation," "Extension," "Tropical Soils," "Forest Relationships," will be looking to the Research Committee for assistance and guidance. Thus the "Committee on Fertilizer Recommendations" will be particularly dependent on research for definite help once the great mass of data and recommendations that are available have been assembled and analyzed as a basis for further study.

VI. SOIL AND WATER CONSERVATION COMMITTEE

Mr. George B. Hills	Jacksonville (Chairman)
Mr. John A. Baker	New York City
Mr. J. E. Beardsley	Clewiston
Dr. A. P. Black	Gainesville
Mr. V. V. Bowman	Gainesville
Dr. Geo. F. Catlett	Jacksonville
Mr. B. S. Clayton	Belle Glade
Mr. C. Kay Davis	Ft. Lauderdale
Mr. F. C. Elliot	Tallahassee
Mr. C. L. V. Exselsen	New York and Miami
Mr. Herman Gunter	Tallahassee
Mr. Ben Herr	West Palm Beach
Mr. H. R. Leach	Washington, D. C.
Mr. Frazier Rogers	Gainesville
Mr. D. S. Wallace	Ocala
Mr. W. Turner Wallis	West Palm Beach (Secretary)
Mr. J. Mark Wilcox	Miami

The most important tangible asset of the State, next to the soil, is its water supply. Consequently its efficient conservation and use is a most important and practical problem especially since, under most conditions, in conserving and otherwise properly handling the natural water supply we also protect and maintain the productive capacity of the soil.

The first responsibility of the "Soil and Water Conservation Committee" will be to examine the field from a State-wide viewpoint. Following such an examination, it would naturally be expected that the area with the most critical problems would receive first attention.

Inasmuch as the general field of this committee divides rather sharply into two sections, one of a technical nature having to do with engineering and other technological aspects, and the other of a public relations nature involving land ownership and tax delinquency problems, it is expected that sub-committees to cover these respective phases will be formed.

VII. FERTILIZER RECOMMENDATIONS COMMITTEE

Mr. W. L. Tait	Winter Haven (Chairman)
Mr. G. M. Bahrt	Orlando
Mr. J. F. Bazemore	Orlando
Dr. J. R. Beckenbach	Bradenton
Mr. G. H. Blackmon	Gainesville
Mr. R. E. Blaser	Gainesville
Dr. Frederick Boyd	Belle Glade
Mr. John Camp	Gainesville
Dr. Dana G. Coe	Lakeland
Mr. E. F. DeBusk	Gainesville
Mr. R. S. Edsall	Wabasso
Mr. W. M. Fifield	Homestead
Mr. B. F. Floyd	Davenport
Mr. T. J. Hanley	Nichols
Mr. J. R. Henderson	Gainesville
Dr. F. S. Jamison	Gainesville
Mr. J. G. Kelley	Blountstown
Mr. C. D. Kime	Gainesville
Mr. J. H. Logan	Clearwater
Dr. A. R. Merz	Washington, D. C.
Mr. M. U. Mounts	West Palm Beach
Dr. J. R. Neller	Belle Glade
Mr. W. T. Nettles	Gainesville
Mr. R. E. Norris	Tavares
Mr. F. M. O'Byrne	Lake Wales
Mr. A. J. Peacock	Plant City
Mr. W. H. Sachs	Orlando
Mr. J. Lee Smith	Gainesville
Mr. J. J. Taylor	Tallahassee
Mr. H. A. Thullbery	Haines City
Mr. G. M. Volk	Gainesville
Mr. W. F. Ward	Brooksville
Mr. J. D. Warner	Quincy
Mr. Alec White	Tampa

For a long time the fertilizer situation in Florida has been regarded as being so complex and involved as to defy comprehensive analysis and study. Such a view would seem to be supported somewhat by the fact that during the fiscal year 1938-39 nearly 8500 fertilizer brands and special mixtures were registered in the office of the State Chemist in Tallahassee!

This is doubtless due in good part to the fact that there is such a wide variety of plants grown in the state on a commercial and sub-commercial basis and for a great diversity of other purposes; also to the fact that our soils are so complex and variable and, as yet, have been systematically surveyed only to a very limited extent; and furthermore, more and more elements in the "trace element" group are coming into the field of nutrition; and finally, the temperature range from North to South in the state and the variation in moisture from season to season also adds much to the already complex situation.

In the face of such a thoroughly complex situation and in the absence of anything approximating an adequate research program in soil fertility to progressively keep abreast of the rapidly pyramiding demands there has developed, "Topsy-like", exactly what we now have. In the aggregate it does look complex. Broken into those all-important components, the requirements of the individual plant and soil, it becomes definitely manageable—in fact, comparatively simple.

The first work of the Fertilizer Recommendations Committee shall have to be the grouping of its personnel according to the fields of information with which its members are most familiar and in which they can make the best contributions. Many of the individuals with special knowledge of particular crops such as field crops, truck crops, citrus, etc., might well serve as chairmen of sub-committees for that particular field of effort with freedom to extend the membership of their units and of the committee as a whole, if this appears necessary in order to get on with the work in an effective manner.

Before actually starting the work, doubtless it will be found convenient to develop a systematic manner of recording the ideas, practices and data now extant and in common use relating to the fertilizer and cultural needs of the individual crop and the individual soil, breaking it down on a factorial basis until adequate integration and study can be made of the whole.

Once the information is individualized in this way and so arranged that it can be approached in an understanding manner, much may be done in grouping that pertaining either to soils or plants or both. Where information is inadequate or wholly lacking, however, we should face the situation squarely and plan our research program accordingly.

As a matter of fact, it is anticipated that the findings of the committee may be of more value to the Research Committee as a background for planning further work than for any direct usefulness they may have in the applied field. In any event it is an interesting field of effort and its critical importance bespeaks the sympathy and assistance of the whole Society for the membership of this committee.

VIII. TEACHING COMMITTEE

Chairman: Dr. F. B. Smith
Professor of Soil Microbiology, University of Florida, Gainesville

The function of this committee shall be not only to encourage the teaching of soils but to improve the character of the training that is given on all levels of instruction.

Education is the key to a great many of the social problems with which we are struggling. What will it profit us to develop information by intensive research in soils or any other agricultural subject if there is not available trained leadership in the field to put it effectively into practice?

The personnel and program of this committee will be developed during the coming year and is certain to find a field that is rich in opportunity.

IX. EXTENSION COMMITTEE

Chairman: Mr. Ed. L. Ayers
County Agent, Manatee County, Bradenton

In many parts of the country it is sometimes thought that extension work in agriculture is "getting ahead" of research, as it were. Since extension work in soils in Florida is still to be initiated for the most part, obviously we have not yet arrived at the above danger by a considerable margin.

In Mr. Ayers the Society has a capable salesman who knows the problem well. He now has the year before him to get his group together and get on with the task.

X. TROPICAL SOILS COMMITTEE

Chairman: Dr. H. H. Bennett
Chief, Soil Conservation Service, Washington, D. C.

Much has been said, especially during the past two or three years, regarding the vitalization of our relationships with our Latin American neighbors to the South. In all of this, one has heard little mention of such an humble approach to the problem as through the strong community of interest that is being found in soil and plant relationships and the vital challenging problems associated with them everywhere.

To the extent that this is true, it is believed we have neglected a channel of contact that is more powerful in its own way than anything which has been known to diplomacy of the conventional kind. Further than this, our problems here in Florida have more in common with those of the Inter-American nations than do those of any other State.

In asking Dr. Bennett to accept the Chairmanship of the Committee on Tropical Soils we had in mind not only the broad experience he has had in this field and his deep technical interest in these soils but also those qualities of leadership which have raised him in a few years from the position of an individual worker to the head of one of the most important Bureaus in the entire Government when measured by the rapidity of its growth and the essential good it has done.

XI. FOREST RELATIONSHIPS COMMITTEE

Chairman: Prof. H. S. Newins

Director, School of Forestry, University of Florida, Gainesville

It is feared that too frequently we look upon growing trees as natural entities that will develop in spite of any progressive changes that might be taking place in the soil environment either as a result of their growth or for other reasons. The cycle of the forest "crop" is so long that alterations in plant and soil characteristics and growth rate may not be too quickly discernible.

The essential "thinness" of some of our Florida soils upon which we may wish to continue to grow trees for many centuries is such that perhaps we should be especially solicitous of what the individual timber crop is removing from the land and just what should be done to maintain the productivity of various types of soil in terms of forest growth in the future.

All of this is, of course, intimately bound up with other soil problems such as moisture supply, the effect of burning forest cover, etc., which combine to make an interesting field for discussion and study. If the committee to be developed can match in vigor and enthusiasm that of our newly established School of Forestry, then we shall indeed have added a lively adjunct to our Forum.

XII. ANIMAL RELATIONSHIPS COMMITTEE

Chairman: Dr. R. B. Becker

Animal Husbandman, Agricultural Experiment Station, Gainesville

In consequence of the important discoveries that have been made during the past few years in the field of plant, animal and human nutrition that center around the apparently vital role of several of the trace elements in living processes, a new and rapidly growing interest has developed in soil and plant relationships from this standpoint.

Insofar as Florida is concerned there are, for instance, extensive areas of our pasture and range lands that are known to produce forage and pasture plants deficient in certain of these elements. An important beginning has been made in this study but it is fully recognized as only a start. Work of this nature must be developed on the basis

of soil type and plant quality if we are to have a picture of the problem that is clear and sound from every standpoint.

Doctor Becker and his associates in the Department of Animal Husbandry have made good progress in attacking this broad problem in this basic manner which will not only encourage fundamental work on soil and plant relationships, but furnish information that is vital in the field of human nutrition. This is particularly true since man requires both plant and animal sources of food in his diet so the condition of his nutrition, as related to the soil, is not only affected directly by the plant but indirectly by it, as well, through the animal.

XIII. HUMAN RELATIONSHIPS COMMITTEE

Chairman: Dr. Chester F. Ahmann
1043 West Masonic Street, Gainesville

Whether we have it clearly in mind at all times or not, the true objective of practically all our agricultural research and study is the comfort and well-being of man. As the result of several years of specialized training and of active research in the field of human nutrition while connected with the Agricultural Experiment Station, it is doubtful if there is any physician or other individual in the State who has the picture of human dependence on food qualities derived from the soil so clearly in mind as Doctor Ahmann.

As a practicing physician Dr. Ahmann continues to have daily opportunity for case studies in this field, many of them the epitome of human misfortune and despair. The situation is, of course, much worse in some sections of the State than in others. It will be the particular function of this committee to effect and maintain the strongest possible liaison between the medical profession on the one hand and the broad field of agricultural research involving soil, plant, animal and human relationships on the other, which associations and contacts can be so mutually helpful, if sympathetically maintained, in advancing the study and care of this phase of our social problem from a number of standpoints.

XIV. RESOLUTIONS AND PRESS COMMITTEE

Chairman: Mr. W. F. Therkildson
Editor, "All Florida", The Miami Herald

The responsibility of the Resolutions and Press Committee of any organization that has a healthy desire to grow and do things is so well known as scarcely to deserve comment especially when our Society has had the good fortune to find such a Chairman as Mr. W. F. Therkildson to "take over."

All Florida is rapidly coming to know "Therk" through his "ALL FLORIDA" page that appears regularly in the Miami Sunday Herald. The editorial skill with which he has developed this assignment is a real tribute to the ingenuity, industry and experience that stand behind his daily routine.

However the Society may develop in the future and whatever it may accomplish, it is certain to be heavily indebted to the overall work of this group. Accordingly the Executive Committee is asking Mr. Therkildson to develop the personnel and program of his committee as best fits his ideas and plans for the future.

Charter Members of the Society

•

The Executive Committee is confident that all persons interested in soils work from any standpoint in Florida, will be pleased to learn that our Soil Science Society closed its first official year with a charter membership roll totaling 375 names.

ABBOTT, JOHN B., Dir. Agr. Research, Am. Cyanamide Co., 30 Rockefeller Plaza, New York, N. Y.
ADAIR, W. J., Florist, Box 471, Jacksonville.
ADDERLEY, J. C., Agriculturist, Box 430, Pensacola.
AHMANN, DR. C. F., Physician and Surgeon, 1043 W. Masonic St., Gainesville.
ALLABAND, WILLIAM A., Area Conservationist, S. C. S., Tallahassee.
ALLISON, DR. R. V., Head, Dept. of Soils, U. of Fla., Gainesville.
ALSMEYER, LOUIS H., County Agricultural Agent, Sebring.
ANDERSON, E. J., Bookkeeper, 320 Valencia Rd., W. Palm Beach.
ANDERSON, FRED S., Nurseryman, 331 Tarpon Drive, Ft. Lauderdale.
ANDREWS, DR. F. B., Assoc. Truck Horticulturist Everglades Experiment Station, Belle Glade.
ARNAU, N. L., Wabasso.
AYERS, ED. L., County Agricultural Agent, Bradenton.

BAHRT, GEO. M., Assoc. Soil Technologist, Bureau of Plant Industry, U. S. D. A., Orlando.
BAILES, S. E., Salesman, Box 64, Eustis.
BAILEY, E. R., Tung Grower, Box 202, Ocala.
BAILEY, R. Y., Regional Agronomist, Soil Conservation Service, Spartanburg, South Carolina.
BAKER, JOHN H., Executive Director, Nat. Assoc. of Audubon Societies, 1006 Fifth Ave., New York, N. Y.
BANNING, FORREST D., Civil Engineer, Fla. Power and Light Co., Palatka.
BARBER, RAYMOND, V., Armour Fertilizer Works, Palmetto.
BARNETT, GORDON J., Fern Grower, Fern Park.
BARNETT, W. L'E., Chairman, State Research Committee, Florida Citrus Growers, Inc., Mt. Dora.
BARTLUM, W. LEONARD, Pres., Florida Agr. Supply Co., Orlando.
BAUMGARTNER, T. R., Landscape Gardener, Box 328, North Miami.
BAZEMORE, J. F., State Manager, Chilean Nitrate Educational Bureau, 56 East Pine St., Orlando.
BEARDSLEY, J. E., Real Estate and Farming, Clewiston.
BEARDSLEY, J. W., Student, University of Florida, Clewiston.
BECKENBACH, DR. J. R., Truck Horticulturist in Charge, Bradenton Field Station, Bradenton.
BECKER, DR. R. B., Dairy Husbandman, Fla. Agr. Expt. Sta., Gainesville.
BECKMAN, B. J., Gardener, 3747 Main Highway, Coconut Grove.
BELL, DR. C. E., Associate Chemist, Fla. Agr. Expt. Sta., Gainesville.
BENNETT, GARDNER, Dist. Supervisor, Farm Security Adms., 3120 San Jose St., Tampa.
BENNETT, DR. H. H., Chief, Soil Conservation Service, U. S. D. A., Washington, D. C.
BENSON, NELS, Grad. Student, State Col. of Wash., Pullman, Wash.
BERRY, J. B., Soil Chemist, Waverly Growers Corp., Winter Haven.
BESTOR, HORACE A., Civil Engineer, U. S. Sugar Corp., Clewiston.
BETZNER, L. C., Hardware Merchant, Belle Glade.
BITTING, CLARENCE R., President, U S. Sugar Corporation, New York, N. Y.
BLACK, DR. A. P., Prof. of Agr. Chemistry, Univ. of Fla., Gainesville.
BLACKMON, G. H., Head, Dept. of Hort., Fla. Agr. Exp. Sta., Gainesville.
BLASER, JOHN A., Pres.-Mgr., Royal Palm Nurseries, Oneco.
BLASER, ROY E., Asst. Agronomist, Fla. Agr. Exp. Sta., Gainesville.
BOLTON, W. E., Asst. Agr. Supt., Western Division, U. S. Sugar Corporation, Clewiston.
BOOTH, W. S., Citrus Grower, Conner.
BOOTS, V. A., Farm Supplies, South Bay.
BORDA, EUGENE, Grad. Student in Soils, Univ. of Fla., Gainesville.
BOUIS, C. G., President, Florida Fruit Company, Fort Meade.
BOURNE, DR. B. A., Chief, Agr. Research, U. S. Sugar Corp., Clewiston.
BOWMAN, S. H., Pres., Fla. Assoc. Real Estate Boards, Clermont.
BOWMAN, V. V., Asst. to the Director, Fla. Agr. Exp. Sta., Gainesville.
BOYD, E. M., Eagle Lake.
BOYD, DR. FREDERICK, Asst. Agronomist, Everglades Exp. Sta., Belle Glade.
BRADDOCK, R. L., Farmer, Belle Glade.
BRAGDON, K. E., Production Mgr., Winter Haven Citrus Growers' Association, Winter Haven.
BREGGER, DR. THOMAS, Sugarcane Physiologist, Everglades Experiment Station, Belle Glade.
BRIGGS, W. R., Horticulturist, Growers' Fertilizer Co., Ft. Pierce.
BRIGHT, JAS. H., President, Martha Bright Ranch, Hialeah.
BROOKS, DR. A. N., Plant Pathologist, Plant City Field Station, Box 522, Lakeland.
BROOKS, J. H., Manager, East Coast District International Fruit Corp, Peters.
BROWER, J. K., Island Nurseries, Box 110, Palm Beach.
BROWN, H. C., Mgr. Am. Diatomite Co., Clermont.

BROWN, HAMLIN L., Dairy Husbandman, Agr. Extension Service, Gainesville.
BROWN, M. L., Lab. Asst., Citrus Exp. Station, Lake Alfred.
BROWN, W. R., The Brown Company, Berlin, N. H.
BRYAN, DON S., Student, Bartow High School, Bartow.
BRYAN, R. L., Secy.-Treas., Lake Garfield Nurseries Company, Bartow.
BRYANT, F. E., Agr. Supt., Eastern Division, U. S. Sugar Corporation, Azucar.
BUCK, DR. WILLIAM J., Physician, Belle Glade.
BUIE, DR. T. S., Regional Conservator, Soil Conservation Service, Spartanburg, S. C.
BURTON, CLIFFORD H., Fern Grower, Crescent City.
BUTLER, ALFRED F., Agricultural Technologist, United Fruit Co., Watson Grove, Gregory Park P. O., Jamaica, B. W. I.

CAIN, THOMAS L., Jr., County Agricultural Agent, Cocoa.
CAMP, JOHN P., Asst. Agronomist, Fla. Agr. Exp. Sta., Gainesville.
CAREL, E. G., Manager, Hector Supply Company, West Palm Beach.
CARLTON, R. A., Agr. Agent, Seaboard Air Line R. R., West Palm Beach.
CARNES, ARVY, Regional Engineer, S. C. S., Spartanburg, S. C.
CARRIGAN, R. A., Asst. Chemist, Fla. Agr. Exp. Sta., Gainesville.
CARTWRIGHT, A. B., Farmer, Chosen.
CASLER, E. T., Chemical Supt., Phosphate Mining Co., Nichols.
CASSELBERRY, HIBBARD, Winter Park Ferneries, Winter Park
CATLETT, DR. G. F., Chief Engineer, State Board of Health, Jacksonville.
CHALMERS, J. G., Chemical Salesman, F. W. Berk and Co., 420 Lexington Ave., New York, N. Y.
CHANDLER, LUTHER, Grower, Homestead.
CHASE, STEPHEN, Citrus Grower, Dunedin.
CHATELIER, DR. PAUL, Chemist, 4360 Central Ave., St. Petersburg.
CLARK, A. S., Eustis.
CLAYTON, B. S., Drainage Engineer, Soil Conservation Service, Everglades Exp. Station, Belle Glade.
CLEMENTS, W. B., Clements' Chemical Pest Service, West Palm Beach.
COACHMAN, WALTER F., Jr., Pres. McLin-Coachman Co., Inc., Jacksonville.
COE, DR. DANA G., Citrus Grower, Mossmoor Estate, Rt. 2, Lakeland.
COLLINS, Wm. R., Citrus Grower, 80 Mt. Tom Road, New Rochelle, N. Y., (Mandarin, Fla.)
COMMANDER, C. C., Gen. Manager, Florida Citrus Exchange, Box 2349, Tampa.
CONKLING, W. DONALD, Citrus Culture Corporation, Eustis.
CONRAD, FRED, Gardener, 3250 South Miami Ave., Miami.
COOPER, DR. WILLIAM C., Associate Physiologist, Bureau of Plant Industry, U. S. D. A., Orlando.
CORRIGAN, FRANCIS H., Poultryman and Grove Owner, Bradenton.
COUCH, R. O., Couch Manufacturing Company, Grant.
COWGILL, CARL F., Nurseryman, 205 Lois Avenue, St. Petersburg.
CROSS, DR. ROY, Chemist, 700 Baltimore Ave., Kansas City, Mo.
CRUMPTON, R. T., Gardening, Boca Grande.

DAETWYLER, M. J., Landscape Nurseryman, 50 E. Colonial St., Orlando.
DANCY, R. C., Fertilizer Salesman, 3216 Emperado St., Tampa.
DAVIS, C. KAY, Area Conservationist, S. C. S., 801 Sweet Bldg., Ft. Lauderdale.
DAVIS, DR. ROBERT L., Assoc. Agronomist, S. C. S., Belle Glade.
DAVIS, DR. R. O. E., Fertilizer Research Div., U. S. D. A., Washington, D. C.
DeBUSK, E. F., Citriculturist, Agr. Extension Service, Gainesville.
DERRYBERRY, W. N., Superintendent of Estate, 6204 South Sta., W. Palm Beach.
DEW, JAMES A., President, Palm Beach Peat Co., Box 132, West Palm Beach.
DOUGLAS, Wm. B., Agronomist, Fellsmere Sugar Producers' Association, Fellsmere.
DUFT, WALTER W., Attorney, 135 S. LaSalle St., Chicago, Ill.
DUKES, HUGH, Asst. Soil Surveyor, S. C. S., Graceville.
duPUIS, DR. J. G., Physician, Surgeon and Farmer, 6043 N. E. 2nd Ave., Miami.
duPUIS, JOHN G., Jr., Dairyman, Box W., Little River Sta., Miami.

EDDINS, DR. A. H., Plant Pathologist, Hastings Field Sta., Hastings.
EDSALL, HENRY J., Citrus Grove Manager, Bradenton.
EDSALL, ROBERT S., Agriculturist, Am. Fruit Growers, Inc., Wabasso.
ELEUTHERA LIMITED, Hatchet Bay, Eleuthera, Bahamas.
ELLIOT, F. C., Civil Engineer, Trustee Internal Improvement Fund, Tallahassee.
ELLIS, ROY H., Insecticide and Fungicide Manufacturer, 1210 Kuhl Ave., Orlando.
ELY, C. W., Farmer, South Bay.
ERCK, GEORGE H., Farmer, Weirsdale.
EVANS, CHARLES B., Asst. Soil Technologist, S. C. S., 801 Sweet Bldg., Ft. Lauderdale.
EVANS, W. E., County Agricultural Agent, Sarasota.
EXSELSEN, CARL L. V., Attorney, 813-14 Ingraham Bldg., Miami.

FAIRCHILD, DR. DAVID, Plant Explorer, Coconut Grove.
FEHMERLING, G. B., Chemist, Citrus Exp. Sta., Lake Alfred.
FEINBERG, IRVING, Research Chemist, Box 118, Sanford.
FIFIELD, W. M., Horticulturist, Acting in Charge, Sub-Tropical Experiment Station, Homestead.
FLANDERS, FRED A., Civil Engineer, U. S. Engineers, Moore Haven.
THE FLORIDA GROWER, Bert Livingston, Assoc. Editor, Box 2350, Tampa.
FLOYD, BAYARD F., Vice-Pres. Wilson and Toomer Fertilizer Company, Davenport.
FORSEE, DR. W. T., Jr., Associate Chemist, Everglades Exp. Sta., Belle Glade.
FT. LAUDERDALE CHAMBER OF COMMERCE, August Burghard, Exec. Sec., Ft. Lauderdale.
FOURMY, JOHN V., Chemist, U. S. Sugar Corporation, Azucar.

FRANCIS, JAMES G., Chemist, Am. Liquid Fertilizer Co. 129 Front St., Marietta, Ohio.
FREE, B. Y., Grower, Belle Glade.
FUGATE, J. BRYANT, Nurseryman, Boca Grande.
FULLER, GLENN L., Chief, Regional Physical Surveys, S. C. S., Spartanburg, S. C.

GADDUM, DR. L. W., General College, University of Florida, Gainesville
GALL, OWEN, Junior Soil Surveyer, S. C. S., Hope, Arkansas.
GARY, W. Y., Assistant State Chemist, Tallahassee.
GLAZIER, E., Supt. H. C. Phipps Estate, Box 492, Palm Beach.
GRAHAM, ERNEST R., Dairyman and Farmer, Miami.
GREATHOUSE, DR. LUCIEN H., Chemical Engineer, Citrus Exp. Sta., Lake Alfred
GREEN, THEODORE C., Soil Scientist, S. C. S., Spartanburg, S. C.
GREGG, A. A., Florist, Box 2423, West Palm Beach.
GUNN, COLIN, State Coordinator, S. C. S., Gainesville.
GUNTER, HERMAN, Geologist, State Board of Conservation, Tallahassee.

HAINES CITY CITRUS GROWERS' ASSOC., Haines City .
HALL, JOHN C., Traffic Representative, Merchants and Miners' Line, Miami.
HAMPSON, C. M., Agr. Economist, Agr. Extension Service, Gainesville.
HANDLEMAN, HENRY C., Nurseryman, Lake Wales.
HANEY, H. L., Celery Grower, Belle Glade.
HANLEY, T. J., Comptroller, Phosphate Mining Co., Nichols.
HARTT, E. W., Citrus Grower, Box 356, Avon Park.
HAWKINS, CARL W., Executive Vice-Pres., Model Land Co., St. Augustine.
HEARN, W. E., Regional Inspector, Bureau of Plant Industry, U. S. D. A., Washington, D. C.
HEISER, F. W., Gen. Manager, Fellsmere Sugar Producers Association, Fellsmere.
HELMS, H. B., Area Agronomist, S. C. S., Tallahassee.
HENDERSON, J. R., Assoc. Chemist, Dept. of Soils, Fla. Agr. Exp. Station, Gainesville.
HENDRICKSON, B. H., Project Supervisor, Southern Piedmont Experiment Station, Athens, Georgia.
HENRICKSEN, DR. H. C., The Borinquen Research Laboratory, Eustis.
HERR, BEN, Executive Secretary, Okeechobee Flood Control Board, West Palm Beach.
HILL, ARTHUR M., Jr., Citriculturist, Box 1123, Vero Beach.
HILLS, GEO. B., Consulting Engineer, Box 4817, Jacksonville.
HOCKNEY, GEORGE, Gardener, Box 2193, Sta. A., Palm Beach.
HOLLY HILL FRUIT PRODUCTS, Inc., R. M. Atkins, Pres., Daytona Beach.
HOLMES, JACK O., Landscape Contractor, Box 417, Tampa.
HOOPER, H. P., Gardener, 27 Star Island, Miami Beach.
HORNBURG, DR. P. H., Agronomist, The Organic Nitrogen Inst., Norfolk, Virginia.
HOUGHTALING, FRANCIS S., Farmer, Box 549, Miami.
HOUGHTALING, N. E., Truck Farmer, Box 549, Miami.
HOWARD, R. P., Agricultural Economist, Agr. Extension Service, Gainesville.
HUGHES, R. C., Research Asst. Fla. Agr. Exp. Sta., Gainesville.
HUNDERTMARK, B. W., Field Asst. U. S. Sugar Corporation, Clewiston.
HUNTER, J. H., Asst. Soil Technologist, Bureau Plant Industry, U. S. D. A., Albany, Georgia.
HURLEBAUS, E. H., Production Manager, Clearwater Citrus Growers Association, Clearwater.

JACKSON, R. D., Jackson Grain Company, Tampa.
JACOB, KENNETH D., Chemist, Fertilizer Research Division, Bureau of Plant Industry, U. S. D. A., Washington, D. C.
JAMISON, DR. F. S., Truck Horticulturist, Fla. Agr. Exp. Station, Gainesville.
JERNIGAN, W. P., Asst. Agr. Supt., U. S. Sugar Corp., Azucar.
JOHNSON, JESSE W., Nurseryman, Route 1, Largo.
JOHNSTONE, WILLIAM, Florist and Nurseryman, 1209 Central Ave., St. Petersburg.
JONES, H. W., Asst. Soil Surveyor, S. C. S., Graceville.
JONES, LUTHER, Realtor and Farmer, Belle Glade.
JONES, L. R., Emeritus Prof. of Plant Pathology, University of Wisconsin, Madison, Wisconsin.

KEENAN, EDWARD T., Keenan Soil Laboratory, Frostproof.
KELBERT, DAVID G. A., Asst. Plant Pathologist, Bradenton Field Station, Bradenton.
KELLEY, E. R., Ornamental Gardens, 1018 N. W. 2nd St., Miami.
KELLEY, JOHN G., County Agricultural Agent, Blountstown.
KEW, THEODORE, Chemist, 313 E. Rollins Ave., Orlando.
KIDDER, R. W., Asst. Animal Husbandman, Everglades Experiment Station, Belle Glade.
KILGORE SEED CO., H. R. Manee, Vice-President, Plant City.
KIME, C. D., Sr., Farm Products Agent, Tenn. Coal, Iron and R. R. Co., Box 61, Gainesville.
KIME, C. D., Jr., Graduate Student in Soils, University of Florida, Gainesville.
KINCAID, DR. R. R., Assoc. Plant Pathologist, North Florida Experiment Station, Quincy
KING, BATTY, Nurseryman, Estero.
KING, FRANK C., Agr. Manager, Brown Company, Shawano.
KIRCHMAN, A. E., Oil Distributor, Belle Glade.
KLATTS, L. E., Salesman, Lake Jem.
KLEIN, MILTON A., Gardener, Star Route, Box 150, W. Palm Beach.
KNOWLES, DR. H. L., Ass't. Professor of Physics, Univ. of Fla., Gainesville.
KOPF, A. C., Nueva Gerona, Isle of Pines, Cuba.
KROME, WILLIAM H., Fruit Grower, Box 596, Homestead.
KUNZE, A. E., Chief Metallurgist, Tenn. Coal, Iron and R. R. Co., Birmingham, Alabama.

LAW, PERCY, Sec., Mapes Formula and Guano Co., Jacksonville.
LAWRENCE, ROBERT F., General Supt., Boca Raton Club, Boca Raton.
LAWTON, B. E., County Agricultural Agent, Ft. Lauderdale.

LEACH, H. R., Hydraulic Engineer, S. C. S., Bethesda, Maryland.
LEE, G. W., Manager, Hastings Potato Growers' Assoc., Hastings.
LEHMANN, KARL, Lake County Chamber of Commerce, Montverde.
LEICHLITER, J. FRANK, Landscape Gardener, 1605 E. Ida St., Tampa.
LEIGHTY, RALPH G., Soil Surveyor, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.
LEONARD, GEORGE V., Farmer and Citriculturist, Hastings.
LEWIS, O. C., Area Soils Technician, S. C. S., Tallahassee.
LIEFELD, T. A., Asst. Silviculturist, Southern Forest Experiment Station, U. S. D. A., Lake City.
LOGAN, J. H., County Agricultural Agent, Clearwater.
LOTT, DR. WREAL L., Soil Technologist, U. S. Sugar Corp., Clewiston.
LOWRY, M. W., Regional Soil Conservationist, S. C. S., Spartanburg, S. C.
LUCAS, GLENN H., Salesman, Wilson and Toomer Fertilizer Co., Leesburg.
LYNCH, S. J., Asst. Horticulturist, Sub-Tropical Experiment Station, Homestead.

McCLOUD, D. D., County Agricultural Agent, Perry.
McCONELL, L. S., Gardener, 2025 Brickell Ave., Miami.
McCORMICK, SAM H., Sec.-Treas., Miami Jockey Club, Hialeah.
McINTOSH, HENRY T., District Chairman, National Resources Planning Board, Albany, Georgia.
McPECK, JOHN K., 328 So. Lakeview Drive, Sebring.

MALONE, J. W., County Agricultural Agent, Marianna.
MANATEE FRUIT CO., Palmetto.
MANDA, W. J., Orchid Grower, Okeechobee and Elizabeth Streets, West Palm Beach.
MANN, H. B., Southern Manager, Am. Potash Institute, Atlanta, Georgia.
MARCO, M. B., Asst. Soil Surveyor, Bur. of Plant Industry, U. S. D. A., Washington, D. C.
MATHEWS, A. L., Tech. and Economic Reports, 304 Chamber of Commerce Bldg., Orlando.
MATTHEWS, S. W., Staff Writer, Miami Daily News, Miami.
MERCER, L. R., Supt., B. F. Williamson Co., Gainesville.
MERZ, DR. ALBERT R., Chemist, Fertilizer Research Division, U. S. D .A., Washington, D. C.
MIDDLETON, DR. H. E., Sr. Soil Conservationist, Soil Conservation Service, East Falls Church, Virginia.
MILLER, RALPH L., Entomologist, Fla. Agr. Supply Co., Orlando.
MINER, JAMES T., Farmer, Box 113, Boynton.
MOORE, K. C., County Agricultural Agent, Orlando.
MOORE, O. M., Truck Grower, Belle Glade.
MORAN, JAY W., Vice-President, U. S. Sugar Corporation, Clewiston.
MOSSBARGER, H. L., Florida Power and Light Company, Miami.
MOUNTS, M. U., Count Agricultural Agent, West Palm Beach.

NALL, W. C., Civil Engineer, U. S. Engineers, Moore Haven.
NEFT, JOSEPH, Gardener, Hobe Sound.
NELLER, DR. J. R., Biochemist in Charge, Everglades Experiment Station, Belle Glade.
NELSON, G. M., Landscape Gardener, Melbourne.
NETTLES, W. T., District Agent, Agr. Extension Service, Gainesville.
NEWELL, DR. WILMON, Provost for Agriculture, University of Florida, Gainesville
NEWINS, H. S., Director, School of Forestry, University of Florida, Gainesville.
NIELAND, L. T., Extension Farm Forester, Agr. Extension Service, Gainesville.
NIKITIN, DR. A. A., Tennessee Copper Company, Copperhill, Tenn.
NORRIS, JAMES, Norris Grain Co., 1640 Board of Trade, Chicago, Ill.
NORRIS, R. E., County Agricultural Agent, Tavares.

O'BYRNE, F. M., Waverly Growers' Cooperative, Lake Wales.
O'KELLEY, E. B., Gen. Agr. Agent, Atlantic Coast Line R. R., Jacksonville.

PANCOAST, THOMAS J., Pres. Miami Beach Improvement Company, Miami Beach
PATTERSON, R. Y., Civil Engineer, U. S. Sugar Corporation, Clewiston.
PEACOCK, A. J., Synthetic Nitrogen Products Corp., Box 95, Plant City.
PEECH, DR. MICHAEL, Soils Chemist, Citrus Exp. Station, Lake Alfred.
PETERS, F. C., INC., Truck Crops and Livestock, Goulds.
PETERS, JOHN S., Salesman, International Agr. Corp., Peters.
PHIPPS, JOHN H., Farmer, Box 707, Tallahassee.
PLANK, DONALD K., Forester, U. S. Engineers, Moore Haven.
PLUMMER, J. K., Director, Products Division, Tennessee Corporation, Atlanta, Georgia.
POPENOE, DR. WILSON, Horticulturist, United Fruit Co., Guatemala City, Guatemala.
POWER, J. W., Convention Manager, 306 City Hall, Miami.
PREWITT, W. C., Agr. Supt. Western Division, U. S. Sugar Corporation, Clewiston.
PRINGLE, S. W., Nurseryman, Leesburg.
PRODUCERS SUPPLY, INC., Palmetto.

RAY, W. C., Farmer, Proprietor, Silver Springs, Silver Springs.
RENEGER, C. A., Soil Technologist, Babson Park.
REYNOLDS, B. T., Grove Manager, Auburndale.
RICH, FRANK H., Asst. Production Mgr., Florence Citrus Growers Association, Winter Haven.
RICHARDSON, A. R., Real Estate, Tallahassee.
RICHARDSON, W. W., Sec'y., Simonton Ranch, Inc., Micanopy.
RILEY, J. F., Jr., Investments, Box 70, Palm Beach.

RITCHEY, GEO. E., Associate Agronomist, Bureau of Plant Industry, Fla. Agr. Expt. Station, Gainesville.
ROBERTSON, ROSS E., Farmer, Belle Glade.
ROGERS, FRAZIER, Prof. of Agricultural Engineering, University of Florida, Gainesville.
ROGERS, L. H., Associate Biochemist, Fla. Agr. Exp. Sta., Gainesville.
ROHDE, GEORGE, Traveling Representative, Bausch and Lomb Optical Co., 1324 Eye St., N. W., Washington, D. C.
ROOD, RAY S., Gardener, Jupiter.
ROSS, DR. EDWARD, Chemist, Dr. Phillips Company, Orlando.
ROWE, R. L., Florist and Nurseryman, Drawer W, Melbourne.
RUMSEY, MRS. LEE W., Housewife, Belle Isle, Miami Beach.

SACHS, WARD H., Agronomist, E. I. duPont de Nemours Co., Box 2158, Orlando.
SAVAGE, C. B., Plant Pathologist, West Palm Beach.
SCOTT, ED, Clerk, Circuit Court, Collier County, Everglades.
SCOTT, E. P., Farm Management Specialist, Farm Security Administration, Box 579, Gainesville.
SENN, DR. P. H., Head, Dept. of Agronomy, Agricultural College, University of Florida, Gainesville.
SERVIS, J. D., Graduate Student in Agr. Chemistry, University of Florida, Gainesville.
SEXTON, W. E., Horticulturist, Dairyman, Farmer, Vero Beach.
SHANNON, C. BARRY, Publisher, Palm Beach.
SHAW, C. C., Salesman, Hector Supply Company, Miami.
SHEELY, WALTER J., Extension Beef Specialist, Agr. Ext. Service, Gainesville.
SHELTON, E. N., Tennessee Corporation, Atlanta, Georgia.
SHINN, CHAS. M., Manager, Growers' Fertilizer Cooperative, Lake Alfred.
SHORT, C. R., Box 343, Clermont.
SIEPLEIN, DR. O. J., Research Chemist, Box 215, Coral Gables.
SIMPSON, DR. T. M., Dean, Graduate School, Univ. of Fla., Gainesville.
SINGLETON, GRAY, Agr. Agent, Federal Land Bank, Columbia, S. C.
SKINNER, B. C., Box 3028, Dunedin.
SMITH, DR. F. B., Soil Microbiologist, Univ. of Fla., Gainesville.
SMITH, J. LEE, District Agricultural Agent, Gainesville.
SOULE, M. J., Nurseryman, 933 39th Ave. North, St. Petersburg.
SPARKMAN, J. K., Salesman, U. S. Phosphoric Products Corp., Box 3269, Tampa.
SPENCER, A. P., Vice-Director, Agr. Extension Service, Gainesville.
STABLER, DAVID K., Landscape Supt., Mountain Lake Corp., Lake Wales.
STAFFORD, W. M., Chief Fire Warden, Everglades Fire Control District, Lake Worth.
STAMBAUGH, SCOTT U., Horticulturist, Babson Park.
STAUTENBURG, FRANK, Gardener, Box 133, Coconut Grove.
STEIN, FRITZ, Farmer, Box 488, Belle Glade.
STEPHENS, MILES E., Soil Conservation Service, Spartanburg, S. C.
STETT, FRANK, Manager, Hobe Sound.
STEVENS, F. D., Sugar Cane Agronomist, Everglades Experiment Station, Belle Glade.
STIRLING & SONS, FRANK, Horticulture, R. F. D. Route 1, Ft. Lauderdale.
STOKES, W. E., Head, Dept. of Agronomy, Florida Agr. Experiment Station, Gainesville.
STOREY, NORMAN C., Inventor and Machinist, 825 N. W. 72nd St., Miami.
STORROCK, JAMES D., Landscape Contractor, Box 2348, Palm Beach.
SUGGS, GEO. W., District Mgr., Technical Service Bureau, The Barrett Company, 133 Carnegie Way, Atlanta, Georgia.
SWENSON, A. F., Supt., C. C. Bolton Estate, Box 2586, Palm Beach.
SYNTHETIC NITROGEN PRODUCTS CORPORATION (Dr. Arthur M. Smith), 285 Madison Ave., New York, N. Y.

TABER, G. L., Jr., Nurseryman, Glen Saint Mary.
TAIT, W. L., Int. Fruit Corporation, Winter Haven.
TALBERT, DALE, Grove Manager, Vero Beach.
TAYLOR, ARTHUR E., Soil Scientist, Bureau of Plant Industry, U. S. D. A., Washington, D. C.
TAYLOR, J. J., State Chemist, Dept. of Agriculture, Tallahassee.
TAYLOR, ROY, Gardener, Boca Grande
THERKILDSON, W. F., Editor, "All Florida", Miami Herald, Miami.
THOMAS, WAYNE, Realtor, Plant City.
THOMPSON, RALPH P., Citrus Grower, Winter Haven.
THOMPSON, RUSSELL, Miami Beach.
THORNTON, R. P., Chemist, Thornton and Company, 1145 E. Cass Street, Tampa
THULLBERY, H. A., Production Mgr., Haines City Citrus Growers Association, Haines City.
TIGERT, DR. JOHN J., President, University of Florida, Gainesville.
TOMASELLO, RUDOLPH P., Spraying and Fertilizer Service, 911 Begonia Road, W. Palm Beach.
TOWNSEND, DR. G. R., Plant Pathologist, Everglades Experiment Station, Belle Glade.
TURNER, H. A., Landscape Superintendent, Boca Raton.
TURRENTINE, J. W., President, Am. Potash Institute, Inc., 1016 Investment Bldg., Washington, D. C.

VAN DOREN, H. W., Florist and Nurseryman, 2412 20th St., South, St. Petersburg.
VAN LANDINGHAM, E. M., Grower, Belle Glade.
VAUGHN, H. T., Chemist, U. S. Sugar Corporation, Clewiston.
VOLK, G. M., Chemist, Fla. Agr. Exp. Station, Gainesville.

WAKSMAN, DR. S. A., Prof. of Soil Microbiology, Rutgers University, New Brunswick, New Jersey.

WALKER, DR. M.N., Plant Pathologist in Charge, Leesburg Field Station, Leesburg.
WALLACE, DONALD S., District Engineer, U. S. Geological Survey, Ocala.
WALLIS, W. TURNER, Consulting Engineer, National Resources Planning Board, West Palm Beach.
WARD, W. F., Asst. Animal Husbandman in Charge, W. Central Florida Experiment Station, Brooksville.
WARNER, J. D., Agronomist Acting in Charge, North Florida Experiment Station, Quincy.
WATKINS, MARSHALL O., Asst. County Agricultural Agent, Plant City.
WEAVER, RUDOLPH, Director, School of Architecture and Allied Arts, Univ. of Florida, Gainesville.
WEDDING, CHAS. R., Nurseryman, St. Petersburg.
WEDGWORTH, MRS. RUTH S., Manager, Wedgworth Estate, Belle Glade.
WELLS, ARTHUR, Farmer, Belle Glade.
WELLS, HENRY K., Real Estate, Palm Beach.
WESEMEYER, FRED J., V. P. A. and W. Bulb Co., Ft. Myers.
WESTBROOK, GEO. F., Clermont.
WESTVELD, R. H., Prof. of Silviculture, Univ. of Fla., Gainesville.
WHIPP, C. LESLIE, Whipp's Azalea Gardens, Callahan.
WHITAKER, J. W., Sales Manager, Swift and Company, Bartow.
WHITE, ALEC, County Agricultural Agent, Tampa.
WILCOX, C. B., Citrus Grower, 316 DeSoto Circle, Orlando.
WILCOX, J. MARK, Seybold Bldg., Miami.
WILCOX, MARK, Farmer, R. R. No. 3, Box 482, Orlando, (Bridgeton, Pa.)
WILL, L. E., Garage Operator, Belle Glade.
WILLIAMSON, B. F., Chemist, Manufacturer and Farmer, Gainesville.
WILLIAMSON, F. L., Grower, Clewiston.
WILLIAMSON, DR. R. C., Head Prof. of Physics, Univ. of Fla., Gainesville.
WILLSON, GEO. C., Graduate Student in Soils, Univ. of Fla., Gainesville.
WILSON, JOHN R., Spraying and Insecticides, Box 6044, West Palm Beach.
WILSON, LEO H., Production Manager Domino Citrus Association, Box 48, Bradenton.
WILSON, R.A., Nurseryman, Jupiter.
WINTER GARDEN ORNAMENTAL NURSERY, INC., Wholesale Growers of Tropical Plants, Winter Garden.
WIRT, EARL, Jr., Asst. in Horticulture, Florida Agr. Experiment Station, Gainesville.
WITT, A. C., Florist, Box 4-A, South Miami.
WOLF, NORMAN L., Grove Owner and Operator, Cocoa.
WOOD, J. H., Gardener, 4705½ Parker Ave., W. Palm Beach.
WOOD, GAR, Pres. Chemurgic Research Corporation, 813-14 Ingraham Bldg., Miami.
WRAY, FLOYD L., Citrus, Hollywood.
WRIGHT, STANLEY H., Coordinator, Southeastern Florida Joint Investigation, Box 1188, West Palm Beach.

YANCEY, F. D., Fruit Grower, Umatilla.
YOTHERS, W. W., Consulting Citriculturist, 457 Boone Street, Orlando.
YOUNG, DR. C. T., Banking and Investments, Box 948, Plant City.
YOUNG, T. W., Graduate Student, Dept. of Horticulture, Cornell University, Ithaca, New York.

ZIEGLER, L. W., Winter Haven.
ZIPPERER, J. O., Rex Beach Farms, Ft. Myers.

It will be greatly appreciated if members will send in corrections or additions for the names and addresses in the above membership roll, as we are anxious to have it as complete and correct as possible. We believe it a worthwhile part of the record to have the occupation or business connection of each member known to the whole group and solicit the assistance of each individual to that end.

Constitution and By-Laws of the Soil Science Society of Florida

•

NAME

Article I.

The name of this organization shall be the Soil Science Society of Florida.

OBJECTIVES

Article II.

The objectives of this Society shall be to foster all phases of Soil Science, both as to its development and application, namely, in the fields of research, teaching and extension.

MEMBERSHIP

Article III.

Any person or organization interested in the objectives of the Society shall be eligible to membership in the Society.

SECTIONS

Article IV.

The integration of the activity of the Society shall be limited to certain functional committees until it becomes evident that sectionalization on the basis of subject matter will serve a definite purpose in advancing the work. Such committees will be appointed each year.

AFFILIATION

Article V.

This Society may become affiliated, as a State unit, with such National Soc-ities as the Soil Science Society of America provided the requirements of such affiliation are not such as to be at variance with the provisions of the Constitution of the Florida Society.

OFFICERS OF THE SOCIETY

Article VI.

The officers of the Society shall be a President, a Vice-President, a Secretary-Treasurer, and an Executive Committee. The Executive Committee shall consist of the President of the Society (Chairman), the Vice-President, the Secretary-Treasurer, and the most recent past president.

ELECTION OF OFFICERS

Article VII.

The President shall appoint a nominating committee of three members in advance of the annual meeting. This committee shall nominate a candidate for Vice-President, the Vice-President for the year automatically succeeding to the presidency. Other nominations may be made from the floor. Election of the Vice-President shall be by ballot. The term of office shall be for one year. The Secretary-Treasurer shall be appointed by the Executive Committee.

DUTIES OF OFFICERS

Article VIII.

Section 1. The President shall be the Executive Officer of the Society. He shall preside over the meetings of the Society and its Executive Committee. He shall be responsible for the arrangement of the programs of the Society with the help of the Executive Committee and such other assistance as he may appoint or request.

He shall appoint such committees as may be deemed advisable by the Executive Committee under Article IV of the Constitution or as may be requested or directed from the floor by majority vote.

He shall continue to serve on the Executive Committee of the Society for one year following his retirement from the presidency.

Section 2. The Vice-President shall be elected annually by ballot from the slate prepared by the nominating Committee supplemented by any nominations from the floor.

He shall act for the President in his absence and otherwise assist him with the duties of that office.

He shall automatically succeed to the presidency of the Society at the expiration of his annual term.

Section 3. The Secretary-Treasurer shall be appointed by the Executive Committee.

He shall keep the minutes of all regular meetings and the financial records of the Society.

He shall pay the bills of the Society, following the approval of the President.

He shall act as Secretary and as Editor of the Executive Committee in its function as an Editorial Board.

Section 4. The Executive Committee shall outline the program of activities and formulate the policies of the Society.

It shall recommend functional committees for appointment under Article IV of the Constitution.

It shall act on all matters arising between the regular meetings of the Society.

It shall act as the Editorial Board of the Society of which the Secretary-Treasurer shall be the Editor.

TIME AND PLACE OF MEETING

Article IX.

The annual meeting of the Society or any joint meeting of the Society with other societies shall be at a time and place determined or agreed upon by the Executive Committee of the Society.

AMENDMENTS

Article X.

Amendments may be proposed (1) by the Executive Committee directly or (2) by petition of any ten (10) members of the Society. The amendment may be adopted by a two-thirds vote of the members present at any annual meeting, provided notice of same has been distributed to the membership of the Society at least fifteen (15) days previous to the meeting at which it is to be acted upon.

BY-LAWS

1. **Dues.** The annual dues for membership in the Society shall be one dollar ($1.00).
2. **Expenditures.** Bills for any expenditures made by the officers of the Society in transaction of official business, after approval by the President of the Society, shall be submitted to the Treasurer for payment.
3. **Committees.** Such standing and special committees may be appointed by the President as seems desirable to carry on the work of the Society, as provided by Article VIII, Section 1, of the Constitution.
4. **Quorum.** A quorum at the annual meeting or any other business meeting which may be called shall consist of at least 20 per cent of the members.
5. **Amendments.** The by-laws may be amended at any regular meeting of the Society by a two-thirds vote of the members present.

Adopted in Organization Session
Hollywood, Florida
April 18, 1939.